

**FALLUJA WASTE WATER
TREATMENT SYSTEM:
A CASE STUDY IN WARTIME
CONTRACTING**

**SIGIR 12-007
OCTOBER 30, 2011**

Report Documentation Page			<i>Form Approved OMB No. 0704-0188</i>	
<p>Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p>				
1. REPORT DATE 30 OCT 2011	2. REPORT TYPE	3. DATES COVERED 00-00-2011 to 00-00-2011		
4. TITLE AND SUBTITLE Falluja Waste Water Treatment System: A Case Study in Wartime Contracting			5a. CONTRACT NUMBER	
			5b. GRANT NUMBER	
			5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)			5d. PROJECT NUMBER	
			5e. TASK NUMBER	
			5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Office of the Special Inspector General for Iraq Reconstruction, 2530 Crystal Drive, Arlington, VA, 22202-3940			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSOR/MONITOR'S ACRONYM(S)	
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited				
13. SUPPLEMENTARY NOTES				
14. ABSTRACT				
15. SUBJECT TERMS				
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 50
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified	19a. NAME OF RESPONSIBLE PERSON	



Summary of Report: SIGIR 12-007

Why SIGIR Did This Study

The Falluja Waste Water Treatment System was one of the largest and most expensive construction projects in Iraq. It was part of a broad strategy to improve Iraq's infrastructure so as to win the hearts and minds of the Iraqi people. This report discusses the history and outcomes of the Falluja Waste Water Treatment System and examines the lessons learned from this difficult reconstruction experience as applied to wartime contracting.

Lessons Learned

A successful reconstruction program requires a balancing of security, political, and economic interests. Reconstruction cannot proceed on a large scale without the requisite security to protect those carrying out the projects and those overseeing them. In Iraq, the scope of reconstruction was too often insupportable by available security resources. To this day, Iraq's reconstruction environment has never been truly "post-conflict." Endlessly resuming rebuilding in the wake of sustained attacks on reconstruction personnel and critical infrastructure proved to be a demoralizing and wasteful strategy. In future stabilization and reconstruction operations, the U.S. government should analyze whether and at what costs security risks can be mitigated before proceeding with large-scale rebuilding projects. Such projects should begin only when senior leaders determine that the strategic objective they could fulfill outweighs the risk of failure and the costs of mitigating security risks.

Management Comments and Audit Response

The Department of State and the U.S. Army Corps of Engineers provided comments on a draft of this report. The comments are printed in their entirety in Appendices F and G. The U.S. Central Command provided technical comments that we also incorporated as appropriate in the report.

October 30, 2011

FALLUJA WASTE WATER TREATMENT SYSTEM: A CASE STUDY IN WARTIME CONTRACTING

What SIGIR Found

Heavy fighting in Falluja, poor planning, unrealistic cost estimates, and inadequate funding led to significant cost-overruns and delays in constructing the city's new wastewater treatment system. After seven years and the expenditure of over \$100 million dollars, the backbone of a wastewater treatment system is now in place, which is currently servicing approximately 38,400 residents. But this is far short of the 100,000 residents originally intended to benefit from the system. Despite this shortfall, the facility is expandable and, with additional investment by the Iraqi government, tens of thousands of additional residents could be connected to it. SIGIR notes that the Iraqi government is now supporting the system's current operation and its future expansion. But completion of the existing backbone system was years late and millions of dollars over budget, leaving Falluja's streets torn up and in disrepair for years. Many people, including U.S. State Department personnel, died while working in support of this project.

Assessing the Falluja Waste Water Treatment System solely on its excessive costs and limited results may not fully realize the nature of its secondary goals and objectives. Wartime projects generally have secondary goals that shape management decisions made along the way. This project had the secondary goals of enhancing local citizens' faith in their government's ability to deliver essential services, building a service capacity within the local government, winning the hearts and minds of a critical segment of the Iraqi populace, and stimulating the economy by boosting employment (particularly for young men who were potentially recruitable by the insurgency).

This project was taken on in 2004 in a city wracked by violence. Little planning went into the project, and there was minimal understanding of site conditions, no skilled workforce available, and no clear idea about how much the new system would cost. Very early in the project, security conditions rapidly deteriorated such that the trenches and pipes laid by the U.S. contractor were regularly being blown up, and construction workers were subject to continual attacks. On several occasions, U.S. combatant commanders had to direct the contractor to stop construction until security improved. So many adverse conditions faced this project from the outset; thus, it is hard to understand why it was initiated and continued.

The absence of information or analysis on whether progress was made toward achieving any of the secondary goals makes an assessment of this project's worth or wisdom quite difficult. In the end, it would be dubious to conclude that this project helped stabilize the city, enhanced the local citizenry's faith in government, built local service capacity, won hearts or minds, or stimulated the economy. Coupled with the fact that the outcome achieved was a wastewater treatment system operating at levels far below what was anticipated, it is difficult to conclude that the project was worth the \$100 million investment and the many lives lost.



SPECIAL INSPECTOR GENERAL FOR IRAQ RECONSTRUCTION

October 30, 2011

MEMORANDUM FOR U.S. SECRETARY OF STATE
U.S. AMBASSADOR TO IRAQ
U.S. SECRETARY OF DEFENSE
COMMANDING GENERAL, U.S. CENTRAL COMMAND
COMMANDING GENERAL, U.S. ARMY CORPS OF ENGINEERS

SUBJECT: Falluja Waste Water Treatment System: A Case Study in Wartime Contracting
(SIGIR 12-007)

We are providing this audit report for your information and use. The report discusses the history of the Falluja Waste Water Treatment System construction project and it provides some lessons learned in wartime contracting. We performed this audit in accordance with our statutory responsibilities contained in Public Law 108-106, as amended, which also incorporates the duties and responsibilities of inspectors general under the Inspector General Act of 1978. This law provides for independent and objective audits of programs and operations funded with amounts appropriated or otherwise made available for the reconstruction of Iraq, and for recommendations on related policies designed to promote economy, efficiency, and effectiveness and to prevent and detect fraud, waste, and abuse. This audit was conducted as Project 1018.

The Department of State provided written comments on a draft of this report that we addressed as appropriate. Those comments are printed in their entirety in Appendix F. The U.S Central Command provided technical comments that were also included in the report where appropriate. We appreciate the courtesies extended to the SIGIR staff. For additional information on the report, please contact Glenn D. Furbish, Assistant Inspector General for Audits (Washington, DC), (703) 604-1388/ glenn.furbish@sigir.mil, or Jim Shafer, Principal Deputy Assistant Inspector General for Audits (Washington, DC), (703) 604-0894/ james.shafer@sigir.mil.

Stuart W. Bowen, Jr.
Inspector General

cc: Commanding General, United States Forces–Iraq
Commanding General, Joint Contracting Command–Iraq/Afghanistan

Table of Contents

Introduction	1
Background	1
Key Government Agency Roles	6
After Seven Years, the Falluja Project Remains Incomplete	8
Volatile Security Environment	8
Unrealistic Project Cost Estimates and Completion Time Frames	17
Funding Varied	18
Lack of Adequate Funding	19
Changed Contracting Strategies Further Delayed and Increased Construction Costs	21
Final Project Scope and Cost Decisions Delayed	23
Lack of Communication with Appropriate GOI Reconstruction Officials	23
Falluja's Tribal Customs Further Delayed Construction	24
Major Changes in Project Direction Occurred in 2008	25
Project Impact Is Unknown	28
Conclusions and Lessons Learned	29
Conclusion	29
Lessons Learned	29
Management Comments and Audit Response	31
Appendix A—Scope and Methodology	32
Appendix B—Key Events for the Falluja Wastewater Treatment System Project	34
Appendix C—List of Contracts Associated with the Falluja Wastewater Treatment System Project	36
Appendix D—Acronyms	40
Appendix E—Audit Team Members	41
Appendix F—Management Comments	42

Appendix G—Management Comments **44**

Appendix H—SIGIR Mission and Contact Information **45**



Falluja Waste Water Treatment System: A Case Study in Wartime Contracting

SIGIR 12-007

October 30, 2011

Introduction

This report provides information on one of the largest reconstruction projects undertaken in Iraq; the Falluja Waste Water Treatment System.¹ The project was initiated in June 2004 after U.S. officials approached the Government of Iraq (GOI) and asked what could be done in Falluja to help rebuild the city. The U.S. military had completed a major operation there earlier that year, and the city had sustained heavy damage. The GOI offered a list of projects for the city, including a request for a sewer network system. GOI officials wanted this system to service the residents of the city of Falluja. At the time, Falluja did not have a comprehensive sewage system.

As of September 2011, the treatment facility had an estimated cost of \$107.9 million and is servicing 6,000 homes² (or approximately 38,400 residents).³ To complete the system the GOI will need to spend at least \$87 million more and the entire network collection system is not estimated to be completed until at least 2014. This report examines the Falluja Waste Water Treatment System project and the reasons for its current partially complete status.

Background

The Coalition Provisional Authority (CPA) was created in May 2003 as the interim managing body for governance and reconstruction activities in Iraq following the U.S. invasion in March 2003. The CPA represented a multinational effort led by the United States to rebuild Iraq, restore stability, and aid in establishing an interim Iraqi government. The CPA's ultimate goal for post-war Iraq was "a unified and stable, democratic Iraq that provides effective and representative government for the Iraqi people; is underpinned by new and protected freedoms and a growing market economy; is able to defend itself but no longer poses a threat to its neighbors or international security."⁴

¹ The Falluja Waste Water Treatment System project is also referred to in various documents as the Falluja Sewerage Network project, Falluja Sewer Distribution Network project, and Falluja Sewer Network. For consistency within this report, unless used in a quotation, SIGIR refers to it as the Falluja Waste Water Treatment System.

² The total estimated cost of \$107.9 million includes costs for connecting 9,116 homes to the wastewater treatment plant, of which 6,000 are connected as of September 2011.

³ In order to determine the number of residents currently served by this project, SIGIR used the 2007 World Health Organization/Republic of Iraq "Iraq Family Health Survey Report," average of 6.4 people per Iraqi household. Consequently, 6,000 homes equals approximately 38,400 residents.

⁴ Coalition Provisional Authority, Baghdad, Iraq, *Achieving the Vision to Restore Full Sovereignty to the Iraqi People (Strategic Plan)*, 10/1/2003.

The CPA's strategy for accomplishing this goal consisted of four principle objectives or "core foundations"⁵:

- **Security**—establishing a secure and safe environment
- **Essential services**—restoring basic services to help stabilize Iraq
- **Economy**—creating the conditions for economic growth
- **Governance**—enabling the transition to transparent and inclusive democratic governance

The CPA issued the "Program/Integration Management Plan for Recovery, Reconstruction and Redevelopment of Iraq," with the stated objective to "assist in restoring the stability of Iraq and the Iraqi economy by means of infrastructure and development."⁶

The Administration, in seeking supplemental funding for Iraq's reconstruction, stated:

This budget request will support our commitment to helping the Iraqi and Afghan people rebuild their own nations, after decades of oppression and mismanagement. We will provide funds to help them improve security. And we will help them to restore basic services, such as electricity and water, and to build new schools, roads, and medical clinics. This effort is essential to the stability of those nations, and therefore, to our own security.⁷

To restore essential services in electricity, potable water, sewage, education, and health, the U.S. government's top priority was large-scale infrastructure projects.⁸ Through the Iraq Relief and Reconstruction Fund (IRRF), the U.S. government programmed \$4.2 billion for electricity, \$2.1 billion for the water sector, \$1.7 billion for oil, \$739 million for health services, and \$99 million for education.⁹ Approximately 67% of the funds were aimed at improvements in infrastructure—including electricity, oil production, water and sewerage, transportation, and telecommunications—in order to stabilize the country by creating jobs and stimulating the economy.¹⁰

Project Origins

In March 2004, the western Iraq city of Falluja was a hotbed of Sunni insurgent activity, with increasing numbers of attacks against U.S. and Coalition Forces, contractors, and civilians. On March 31, 2004, insurgents ambushed and killed four U.S. private security contractors in the city, dragged the charred bodies through the streets, and hung the bodies from the Old Bridge¹¹ spanning

⁵ Ibid.

⁶ SIGIR, *Hard Lessons: The Iraq Reconstruction Experience*, Washington D.C., 2/2009.

⁷ The White House President George W. Bush, ed. Office of the Press Secretary, "President Addresses the Nation," 9/7/2003, <http://georgewbush-whitehouse.archives.gov/news/releases/2003/09/print/20030907-1.html>, accessed 10/25/2011.

⁸ United States Department of State, *Rebuilding Iraq: U.S. Achievements through the Iraq Relief and Reconstruction Fund*, 2/2006.

⁹ Report to Congress, Submitted pursuant to U.S. Policy in Iraq Act, Section 1227 of the National Defense Authorization Act for Fiscal Year 2006 (PL 109-163), 4/6/2006.

¹⁰ Congressional Research Service Report for Congress, *Iraq: Recent Developments in Reconstruction Assistance*, Updated 12/20/2004.

¹¹ In April 2006, the GOI refurbished and re-dedicated the bridge as the "King Faisal" bridge.

the Euphrates River.¹² In response to this incident, U.S. Marines initiated Operation Vigilant Resolve to apprehend the assailants and attack insurgent positions throughout the city.¹³ The operation resulted in an estimated 600 Iraqi civilian deaths¹⁴, 1,250 wounded¹⁵, and left the city in shambles.

As a result, Falluja was one of the 10 strategic cities that the CPA identified—Baghdad, Ba’quba, Mosul, Ramadi, Samarra, Tikrit, Najaf, Diwaniyah, and Kerbala were the others—to fund “high-impact, high-visibility projects” aimed to improve access to potable water, sanitation, health, education, and transportation. According to a government study, the strategy was to “focus reconstruction efforts on rapidly rehabilitating areas, such as Falluja, which had been the scene of intense military operations against insurgent forces. U.S. officials argued that the post-battle reconstruction effort was as important as the military effort to insure long-term Iraqi government control of these strategic cities.”¹⁶

In planning these projects in 2004, U.S. officials asked the GOI what could be done in Falluja to help rebuild the city. The GOI requested a comprehensive sewage system because the city did not have one. At the time, residents used either buried holding tanks to collect and store waste, with the septic holding tanks being vacuumed out by a tank truck and disposed of off-site; or connected their home septic holding tanks to the storm water collection system, which resulted in the disposal of waste directly into the Euphrates River. The discharge of raw sewage into the Euphrates River contaminated the river water that the public used for several purposes, including as a source of drinking water. Due to insurgent activity throughout the city, the septic tank trucks were not operating, and holding tanks overflowed, which resulted in sewage running through city streets (see Figure 1). These conditions posed a serious health risk to children, who often played in the streets.

¹² Department of the Navy, United States Marine Corps, *U.S. Marines in Iraq, 2004-2005: Into the Fray*, History Division, U.S. Marine Corps, Washington, D.C., 2011.

¹³ Matt M. Mathews, *Operation AL FAJR: A Study in Army and Marine Corps Joint Operations*, Combat Studies Institute Press, Fort Leavenworth, Kansas, 2006.

¹⁴ United States House of Representatives, Committee on Oversight and Government Reform, Majority Staff, *Private Military Contractors in Iraq: An Examination of Blackwater’s Actions in Fallujah*, 9/2007.

¹⁵ Tao-Hung Chang, *The Battle of Fallujah: Lessons Learned on Military Operations on Urbanized Terrain (MOUT) in the 21st Century*, Department of Naval Science, Rochester, 2007.

¹⁶ Congressional Research Service Report for Congress, *Iraq: Recent Developments in Reconstruction Assistance*, updated 12/20/2004.

Figure 1—Raw Sewage in Falluja Streets



Source: Sewage flowing throughout Falluja city streets (Photo courtesy of the U.S. Army Corps of Engineers, circa 2004).

According to a UNICEF report, by 2003, “diseases associated with poor sanitation, unsafe water, and unhygienic practices increased at alarming rates, contributing to a fast-growing problem of malnutrition, morbidity, and mortality of infants and under-five-year-old children.” In that year alone, “diseases associated with poor water and sanitation were the cause of 25% of all child deaths in Iraq.” For example, “under-five mortality rates per 1,000 live births rose from 56 between 1984 and 1989, to 92 between 1989 and 1994, and as high as 131 during the 1994 to 1999 period. Infant mortality rates per 1,000 live births increased from 47 between 1984 and 1989 to 79 between 1989 and 1994, and as high as 108 in the 1994 to 1999 period.”¹⁷

The GOI had requested a sewer network system that would consist of a wastewater treatment plant, collection areas (including house connections), trunk lines, and associated pump stations that would provide service to most of Falluja’s residents.

¹⁷ Brendan Doyle, *Iraq Watching Briefs—Water and Environmental Sanitation*, UNICEF, 7/2003.

Figure 2—March 2004 Falluja Site Plan



Source: The CPA's original scope for the Falluja WWTS project (courtesy of USACE).

Project Goals

According to CPA documents, the intent of the project was to provide a sewage treatment facility for 100,000 residents. However, a task order scope of work stated that the intent of the project was to “reduce the contamination effects on the receiving waters in Nahr al-Furat.”¹⁸ Specifically, the project would effectively collect and treat most sewage for the city of Falluja, thereby, removing sewage from the city streets and depositing treated wastewater into the Euphrates River. This was expected to result in a decline in diseases associated with poor sanitation and unsafe water and an improved standard of living.

In addition, this project addressed the CPA goal of focusing on large infrastructure projects that would provide stability by increasing essential services, such as sewage treatment. At the time the project was initiated, Falluja was widely considered the most dangerous place in Iraq. The CPA awarded this project as a “carrot” to stabilize the local population by providing an essential service and jobs to Falluja residents.

¹⁸ Nahr al-Furat is the Arabic word for the Euphrates River.

One administration argument for the November 2003 supplemental appropriation was the urgent need to demonstrate progress so as to employ Iraqis and win their hearts and minds.¹⁹ In order to accomplish this, the CPA required FluorAMEC to employ a large number of Iraqis while completing the project within 18 months.

Funding Sources

Although originally funded through IRRF, the government incrementally used other funding sources including the Development Fund for Iraq (DFI), the Commander's Emergency Response Program (CERP), and the Economic Support Fund (ESF). Table 1 shows the current estimated cost of the project and the amounts of money allocated from each fund type. As shown in the chart, \$100 million had been disbursed through July 8, 2011, and the U.S. government plans to spend an additional \$7.8 million on the project.

Table 1—Total Project Costs by Funding Category, as of 7/8/2011

Fund Type	Number of Contracts	Costs
IRRF	23	\$79,338,971.95
CERP	9	\$11,326,731.52
DFI	7	\$8,037,706.10
ESF	3	\$1,320,425.00
Subtotal	42	\$100,023,834.57
Expected Remaining Costs (ESF grant)		\$6,839,000
Future Cost (O&M Training Grant) (ESF contracts)		\$1,000,000
Total	42	\$107,862,834.57

Source: ISPO as of July 8, 2011.

Key Government Agency Roles

Several agencies were involved in program and project management and contracting, for the design and construction of the Falluja Waste Water Treatment System.

Program Management

The Coalition Provisional Authority (CPA) created the Program Management Office (PMO), which was responsible for program management, project management, and contracting for the reconstruction effort in Iraq. On June 28, 2004, when power transferred to the sovereign Iraqi Interim Government, the CPA was officially dissolved. The PMO split into two organizations: the Iraq Reconstruction Management Office (IRMO) was responsible for coordinating the reconstruction effort, and the Project and Contracting Office assumed PMO's project construction and execution responsibilities.

¹⁹ Congressional Research Service Report for Congress, *Iraq: Recent Developments in Reconstruction Assistance*, updated 12/20/2004.

IRMO's responsibilities included strategic planning, prioritizing requirements, monitoring spending, and coordinating with the military commander. IRMO was succeeded by the Iraq Transition Assistance Office (ITAO), another temporary office established to "perform the specific project of supporting executive departments and agencies in concluding remaining large infrastructure projects expeditiously in Iraq, in facilitating Iraq's transition to self-sufficiency, and in maintaining an effective diplomatic presence in Iraq." Finally, ITAO was succeeded by the Iraq Strategic Partnership Office (ISPO), which was established to support executive departments and agencies in facilitating the strategic partnership between the U.S. government and the GOI, in further securing and stabilizing the country, and in continuing an effective diplomatic presence in Iraq.

In this report, we collectively refer to CPA, PMO, IRMO, ITAO, and ISPO as the program office.

Project Management and Contracting

PCO facilitated acquisition and project management support for U.S. government-funded reconstruction projects. The office's responsibilities included contracting for and delivering infrastructure, related services, and supplies. The U.S. Army Corps of Engineers (USACE) activated the Gulf Region District. For efficiency, the Gulf Region District and the Project and Contracting Office merged on December 4, 2005. On October 14, 2006, the Project and Contracting Office's mission officially ended, and the Gulf Region District was appointed as its successor. In this report SIGIR refers to USACE and the Gulf Region Division collectively as the Corps.

The Joint Contracting Command–Iraq/Afghanistan also provided contracting support of vital supplies, services, and construction to the Chief of Mission and the U.S. military. Fragmentary Order 09-668, Contracting and Organizational Changes, created the Command on November 12, 2004, to provide services in support of Iraq relief and reconstruction.

After Seven Years, the Falluja Project Remains Incomplete

As noted, at the time of this report, the U.S. government had invested, or planned to invest, \$107.9 million to construct the Falluja Sewerage Network System and connect it to 9,116 homes.²⁰ The GOI has committed to spend at least \$87 million more to complete the project as originally conceived. However, the entire network collection system will not be completed until at least 2014. SIGIR identified multiple reasons for the current status of the project, including that the program or project management offices failed to:

- appreciate the volatile security environment
- realistically estimate total project costs and completion time frames
- identify adequate funding
- apply a consistent contracting strategy
- communicate with the appropriate GOI reconstruction officials
- recognize Falluja's tribal customs

Volatile Security Environment

Initial reports indicated that Falluja was receptive to Coalition Forces when they entered Iraq in March 2003.²¹ However, on April 28, 2003, Saddam Hussein's birthday, several hundred local Falluja residents marched to a schoolhouse in the center of the city to protest the presence of the U.S. military in the city. As the protestors approached the school, unidentified shots were fired. U.S. troops believed they were being fired upon and opened fire on the large crowd of angry Iraqis²², killing 13 people and injuring 75 others.²³ According to a research center on international issues, the Anbar province is a traditional tribal area subscribing to strict tribal laws. Because Falluja residents believed that the U.S. military had killed some of their own, they were then honor-bound to exact revenge.²⁴ Some credit this event as the birth of the Iraqi insurgency.²⁵

Blackwater Incident and Operation Vigilant Resolve

By September 2003, Falluja had a broken economy, tribal war, and was considered by some as the "most hostile place in Iraq."²⁶ On November 2, 2003, in the single deadliest strike on U.S. forces since the war began, insurgents shot down an American Chinook helicopter near Falluja, killing

²⁰ As of September 18, 2011, 6,000 homes were connected to the waste water treatment plant. A grant was in place to connect a total of 9,116 homes to the system. GOI's Ministry of Municipalities and Public Works was overseeing completion of connections to all 9,116 homes.

²¹ Institute for Defense Analyses, *The Battle for Fallujah: Al-Fajr—the Myth-buster*, 9/2009.

²² *Time Magazine*, "In Fallujah, Where the Dead Have Become Martyrs," 10/8/2010.

²³ Colonel John A. Weil, *The Battle for Fallujah: One Soldier's Memoir*, Arizona Attorney, July/August 2005.

²⁴ Institute for Defense Analyses, *The Battle for Fallujah: Al-Fajr—the Myth-buster*, 9/2009.

²⁵ Ibid.

²⁶ Tao-Hung Chang, *The Battle of Fallujah: Lessons Learned on Military Operations on Urbanized Terrain (MOUT) in the 21st Century*, Department of Naval Science, Rochester, 2007.

16 U.S. soldiers and injuring 21 others.²⁷ Throughout the remainder of the year and into the following year, Falluja continued to be a hotbed of insurgent activity against Coalition Forces, civilians, and contractors.

A flashpoint of insurgent attacks occurred on March 31, 2004, when insurgents ambushed four Blackwater security contractors who had taken a shortcut through Falluja during a supply run for a United Nations food contractor.²⁸ The contractors died amid a volley of hand grenades. A mob gathered, desecrated the bodies, and set them afire. Crowds then dragged the charred bodies through the streets and hung them from the nearby Old Bridge spanning the Euphrates River.²⁹ A sign read, “Fallujah [sic] is the graveyard for Americans.”³⁰ In the aftermath, local universities reportedly endorsed the violence and Falluja *imams* refused to explicitly condemn the killings.³¹

In response to this event, on April 5, 2004, the U.S. Marines launched Operation Vigilant Resolve with the intent of apprehending the assailants. Two Marine battalions began a series of deliberate attacks against insurgent positions throughout the city.³² Under pressure from the Iraqi Governing Council and the CPA, on April 9, 2004, a ceasefire was ordered.³³ The operation ended with an agreement that the Marines would leave the city and transfer the security responsibility to a local force, the “Falluja Brigade”³⁴ to collect weapons from insurgents. By the end of the operation, an estimated 600 Iraqi civilian were killed³⁵, 1,250 were wounded³⁶, and the city was in shambles.

²⁷ Center for Strategic and International Studies, *Low Intensity Conflict and Nation-Building in Iraq: A Chronology*, 10/19/2005.

²⁸ Tao-Hung Chang, *The Battle of Fallujah: Lessons Learned on Military Operations on Urbanized Terrain (MOUT) in the 21st Century*, Department of Naval Science, Rochester, 2007.

²⁹ Department of the Navy, United States Marine Corps, *U.S. Marines in Iraq, 2004-2005: Into the Fray*, History Division, U.S. Marine Corps, Washington, D.C., 2011.

³⁰ Center for Strategic and International Studies, *Low Intensity Conflict and Nation-Building in Iraq: A Chronology*, 10/19/2005.

³¹ Carter Malkasian, Center for Naval Analyses, “Signaling Resolve, Democratization, and the First Battle of Fallujah,” *The Journal of Strategic Studies*, Volume 29, No. 3, 423-452, 6/2006.

³² Matt M. Matthews, *Operation AL FAJR: A Study in Army and Marine Corps Joint Operations*, Combat Studies Institute Press, Fort Leavenworth, Kansas, 2006.

³³ Department of the Navy, United States Marine Corps, *U.S. Marines in Iraq, 2004-2005: Into the Fray*, History Division, U.S. Marine Corps, Washington, D.C., 2011.

³⁴ The Falluja Brigade was established in April 2004. The Marines withdrew to the outskirts of Falluja, and the Falluja Brigade, consisting of Saddam-era Iraqi military leaders, Falluja residents, and former insurgents, was tasked with bringing peace to the city and meeting several demands, such as collecting weapons from insurgents.

³⁵ United States House of Representatives, Committee on Oversight and Government Reform, Majority Staff, *Private Military Contractors in Iraq: An Examination of Blackwater’s Actions in Fallujah*, 9/2007.

³⁶ Tao-Hung Chang, *The Battle of Fallujah: Lessons Learned on Military Operations on Urbanized Terrain (MOUT) in the 21st Century*, Department of Naval Science, Rochester, 2007.

According to *The Journal of Strategic Studies*, the local perception was that insurgents in Falluja had forced an embarrassing withdrawal upon the U.S. military. In addition, the insurgents' point of view was that they attained their major military objective of keeping Coalition Forces out of Falluja. Further, in the minds of many Sunnis, the death and destruction resulting from this offensive now justified ordering a *jihad* against the Coalition.³⁷

Most disturbing was the fact that this offensive did not clear Falluja of extremists and insurgents.³⁸ After the Marines pulled out of Falluja, the Falluja Brigade was not able to disarm all insurgents. By the end of April 2004, Falluja had become a lawless, chaotic place with insurgents in complete control of the city. Al-Qaeda leader, Abu Musab Al-Zarqawi, and local insurgent leaders, Abdullah Janabi and Omar Hadid, had turned Falluja into the supply center for terrorist and suicide bombers across Iraq.³⁹

Amid this chaos, on June 26, 2004, the CPA awarded FluorAMEC a \$28.6 million task order (Task Order 0008) to design, procure, construct, and commission the Falluja Sewerage Network System by February 2006. To initiate the design phase, FluorAMEC and its subcontractor needed to perform site surveys of the entire city, which was impossible. There were no Coalition Forces in the city, and the members of the only GOI security group then present, the Falluja Brigade, had either deserted or joined the insurgency.⁴⁰ Falluja had become an "insurgent sanctuary."⁴¹

Operation Al Fajr (Phantom Fury)

Over the next several months, security within Falluja continued to deteriorate amid intensifying violence. The lack of a central government authority and Coalition Force presence allowed insurgents to establish in-depth fighting positions and obstacles throughout the city.⁴² U.S. military documented considerable insurgent activities, including an estimated 3,000 to 4,500 insurgents in the city⁴³, the use of mosques, hospitals, and cemeteries as fighting and defensive positions, 306 identified defense positions, 203 major weapons storage areas, 11 improvised explosive device (IED) factories, and 3 slaughterhouse/torture chambers.⁴⁴ Figure 3 shows U.S. military photographs of a weapons cache and torture chamber found in Falluja. The city had become a major insurgent command and control node and staging ground⁴⁵ for an increasing number of attacks against Coalition Forces, civilians, and contractors.

³⁷ Carter Malkasian, Center for Naval Analyses, "Signaling Resolve, Democratization, and the First Battle of Fallujah," *The Journal of Strategic Studies*, Volume 29, No. 3, 423-452, 6/2006.

³⁸ Ibid.

³⁹ Tao-Hung Chang, *The Battle of Fallujah: Lessons Learned on Military Operations on Urbanized Terrain (MOUT) in the 21st Century*, Department of Naval Science, Rochester, 2007.

⁴⁰ Matt M. Matthews, *Operation AL FAJR: A Study in Army and Marine Corps Joint Operations*, Combat Studies Institute Press, Fort Leavenworth, Kansas, 2006.

⁴¹ Institute for Defense Analyses, *The Battle for Fallujah: Al-Fajr—the Myth-buster*, 9/2009.

⁴² Ibid.

⁴³ Tao-Hung Chang, *The Battle of Fallujah: Lessons Learned on Military Operations on Urbanized Terrain (MOUT) in the 21st Century*, Department of Naval Science, Rochester, 2007.

⁴⁴ IMEF and MNC-I Effects Exploitation Team, *Telling the Fallujah Story to the World (Third Cut)*, 11/20/2004.

⁴⁵ Carter Malkasian, Center for Naval Analyses, "Signaling Resolve, Democratization, and the First Battle of Fallujah," *The Journal of Strategic Studies*, Volume 29, No. 3, 423-452, 6/2006.

Figure 3—Site Photograph of Weapons Storage and a Torture Chamber



Weapons cache found in a local mosque, November 2004.



Blood stained walls of a torture chamber, November 2004.

Source: Photos courtesy of Multi-National Corps–Iraq, November 2004.

Table 2 shows the number of mosques, hospitals, and other facilities occupied by insurgents.

Table 2—Major Insurgent-occupied Facilities in Falluja

Type of Facility	Total Number
Mosques in Falluja	100
Mosques used as fighting positions/weapons caches	60
Hospitals used as defensive positions	3
Improvised explosive device (IED) factories	11
Slaughterhouse/torture chambers	3
Number of major weapons storage areas	203
Evidence of foreign fighter involvement	2

Source: Multi-National Corps–Iraq, November 2004.

By October 2004, the security situation in Falluja was so hostile that the U.S. Marines put the Falluja Waste Water Treatment System project on hold. The Marines wanted FluorAMEC to wait until after an upcoming operation before continuing with the project. In November 2004, Coalition Forces launched a second offensive, Operation Al Fajr, with the intent to eliminate Falluja as an insurgent sanctuary by destroying anti-Iraqi forces in order to establish legitimate local control.⁴⁶ This operation saw intense fighting between Coalition Forces and insurgents. By the end of this operation, more than

⁴⁶ Institute for Defense Analyses, *The Battle for Fallujah: Al-Fajr—the Myth-buster*, 9/2009.

1,200 insurgents were killed and 1,000 captured⁴⁷, while 70 American troops were killed and 609 injured.⁴⁸ In addition, the Marines utilized tank gun fire, heavy machine guns, and air-delivered ordnance to root out insurgents. This left the city's infrastructure in shambles as sewer and water lines were ruptured, storm-drain pumping stations were destroyed, electrical lines were cut, and transformers were blown.⁴⁹ Figure 4 shows how Falluja looked in November 2004.

Figure 4—Photograph of Falluja in November 2004



Source: Photo courtesy of USACE, November 2004.

December 2004–September 2007

While largely viewed as successful, Operation Al Fajr did not eliminate all terrorists from Falluja; pockets of insurgent strongholds remained throughout the city. In addition, insurgents who fled Falluja prior to the start of Operation Al Fajr returned later to continue the fight against Coalition Forces. According to a Marine colonel stationed in Falluja in December 2004, the city was largely a deserted, dark, and haunted place and the “smell of death was everywhere.”⁵⁰

Yet, in the face of continued violence, the U.S. government pressed ahead with this major infrastructure project to improve the provision of an essential service. The hope was that the enhancement of essential services would help sustain military successes in the fight against the

⁴⁷ American Forces Press Service, *Fallujah Secure, but Not Yet Safe, Marine Commander Says*, 11/18/2004.

⁴⁸ Tao-Hung Chang, *The Battle of Fallujah: Lessons Learned on Military Operations on Urbanized Terrain (MOUT) in the 21st Century*, Department of Naval Science, Rochester, 2007.

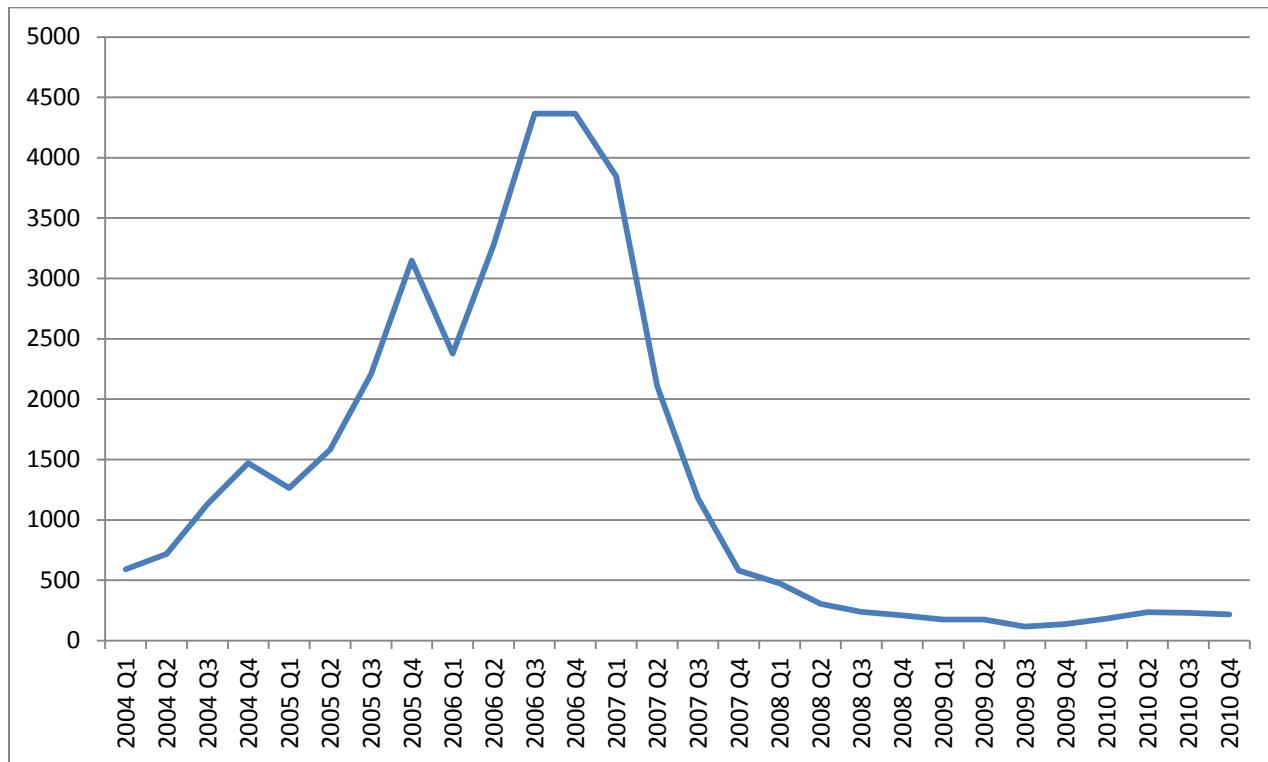
⁴⁹ William F. Mullen III, “Turning Fallujah,” *Small Wars Journal*, 2009.

⁵⁰ Ibid.

insurgency.⁵¹ However, violence against Coalition Forces, Iraqi security forces, civilians, and contractors increased from late 2004 through mid-2007. Figure 5 indicates the number of total security incidents⁵² within Anbar province from 2004 through 2010.⁵³

As was seen throughout the rest of Iraq, violence soared in Anbar province after the February 2006 bombing of the al-Askari Mosque golden dome, setting off a period of extreme sectarian violence. Violence in the province reached its peak in late 2006, with almost 4,500 security incidents occurring within a 90-day period.

Figure 5—Total Security Incidents in Anbar Province between 2004 and 2010⁵⁴



Source: USF-I, 1/4/2011.

Security Environment Caused Project Delays

While the project's program office still wanted FluorAMEC to complete the plant within 18 months, it also advised the contractor that the U.S. military's mission did not include providing security protection for civilians assigned to U.S. government agencies and contractors. Program office officials expected FluorAMEC and its subcontractors to provide their own security to protect their

⁵¹ SIGIR, *Hard Lessons: The Iraq Reconstruction Experience*, Washington, DC: Government Printing Office, 2009.

⁵² USF-I, the author of the total security incidents information, included the following as total security incidents: attacks against Iraqi infrastructure and government organizations, found and cleared bombs, detonated bombs, sniper, ambush, grenade, and other small arms attacks, mortar, rocket, and surface to air attacks.

⁵³ USF-I provided SIGIR security incidents data based only on provinces, not individual districts within provinces.

⁵⁴ USF-I provided the raw data for this figure in response to SIGIR's data call on January 4, 2011.

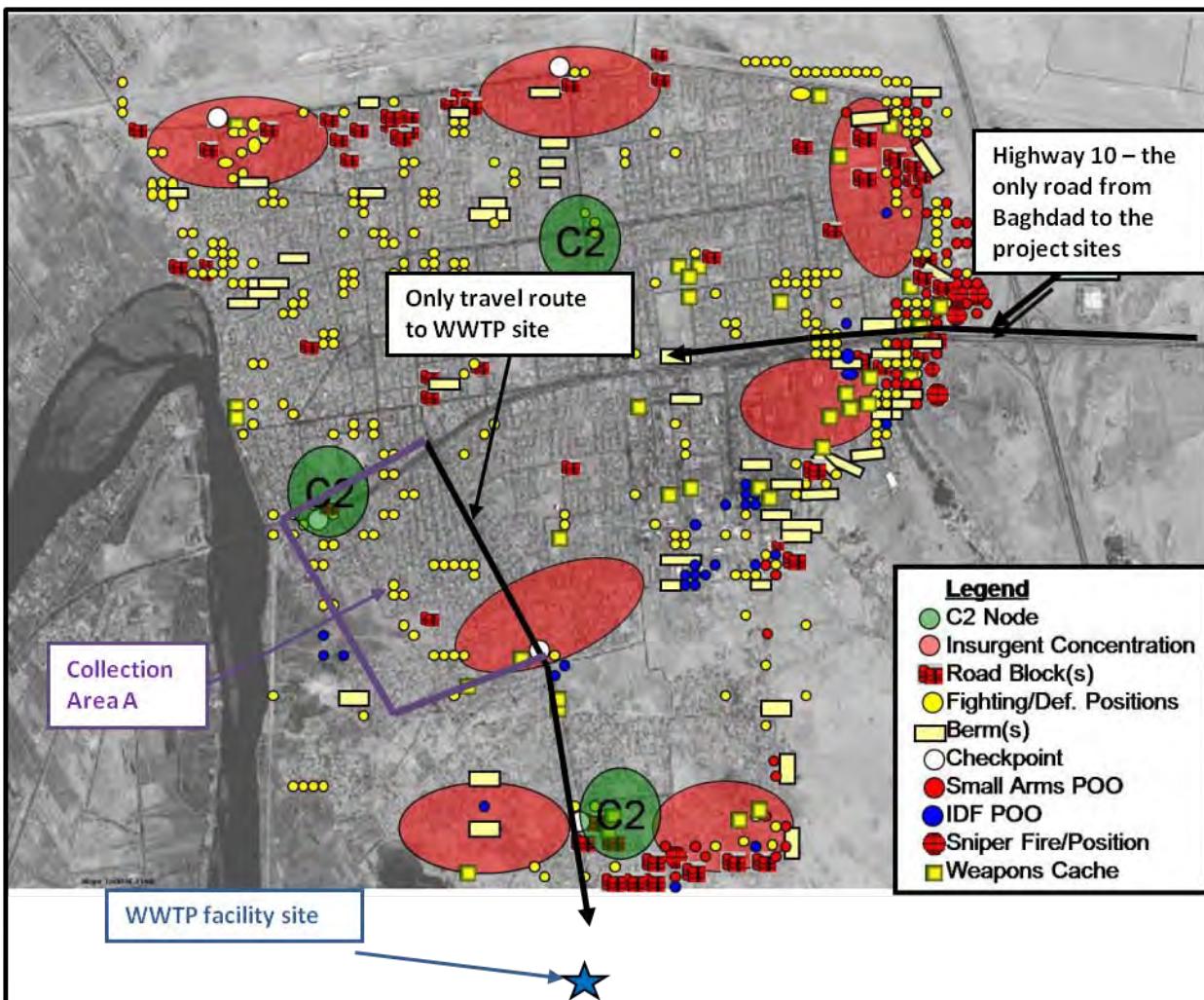
staffs against an insurgency that, between April and December 2004, had killed 151 U.S. troops and wounded more than a thousand.⁵⁵

Notwithstanding a virtual flash flood of adverse circumstances across Iraq in 2004, the U.S. government retained its objective to quickly build large-scale infrastructure projects to improve conditions and win Iraqi support. In Falluja, the U.S. government wanted to provide sewage treatment in the hopes it would win over the population and increase stability in a broader area. Given this, it is clear that U.S. officials did not fully appreciate Falluja's security environment and the impact it would have on FluorAMEC's ability to design and construct the wastewater treatment system. Figure 6 provides a military threat overview of Falluja in late 2004 and illustrates the magnitude of insurgent activities and strongholds.

Falluja's Highway 10 runs east to west, bisecting the city. Because the majority of the construction materials would be driven from Baghdad, on Highway 10, FluorAMEC and its subcontractors would have to navigate through an endless maze of insurgent concentration areas, insurgent defensive positions, weapons caches, checkpoints, roadblocks, sniper fire positions, small arms positions, and berms to deliver materials and equipment to project sites throughout the city. In addition, FluorAMEC's task order required initial construction in Collection Area A which, according to the military threat overview, included a portion of an insurgent concentration, countless insurgent defensive positions, weapons caches, and roadblocks. In SIGIR's view, the program office was unrealistic in expecting FluorAMEC and its subcontractors to maneuver throughout the city in support of this project without encountering significant resistance and hostilities from local insurgents.

⁵⁵ Tao-Hung Chang, *The Battle of Fallujah: Lessons Learned on Military Operations on Urbanized Terrain (MOUT) in the 21st Century*, Department of Naval Science, Rochester, 2007.

Figure 6—Falluja Threat Overview, 2004



Source: Institute for Defense Analysis, 9/2009.

Attacks against the Waste Water Treatment System Project

2004–2007

The Falluja Waste Water Treatment System project was not immune from the violence swirling around it. To the contrary, from the start, the project was plagued by security incidents, such as kidnappings of staff and their family members, hijackings of project materials, contractor intimidation and extortion, theft, equipment damage, small arms fire, injury, and death. Subcontractors attempting to conduct geo-technical and survey work were consistently hampered by confrontations with squatters, and one member of the survey party received a gunshot wound. Once construction began, one contractor's senior managers were kidnapped and one was severely beaten. Several contractors left the country out of fear for their lives. In addition, one contractor was forced to share 10% of his earnings with terror groups.⁵⁶

⁵⁶ USACE, Summary Report, SS-016 Fallujah Waste Water System Project Update, 7/15/2008.

The project suffered additional delays as contractors and the U.S. military had to deal with unexploded ordnance and IEDs throughout the city. According to a U.S. representative, insurgents planted unexploded ordnance at the planned site for the treatment facility, which required coordination with the military to clear before FluorAMEC could break ground. In addition, after subcontractors began trenching and installing pipes, insurgents planted IEDs in the trenches, which collapsed trenches and ruined pipes. Because trenching is a labor-intensive and time-consuming process, having to clear the trenches and then trench again added considerable time to the overall project.

Throughout the greater part of this project's first four years, the military had locked down the city for security purposes. For example, in April 2007, the U.S. Marines issued an order to suspend almost all trench work due to concerns over IEDs implanted in the trench area. This three-month security suspension on trenching affected work on the construction of four trunk lines, as well as the collection networks in Areas A, B, and C, which resulted in additional costs and extending overall project completion. And, for a period of time, the U.S. Marines did not allow movement of large equipment within the city. In instances where trucks were allowed into the city, Marines thoroughly searched them. For example, Marines required trucks hauling construction materials to the project sites, such as sand and gravel, to empty their contents onto the ground and then reload the contents back onto the trucks after being searched for explosives. According to a former U.S. official, this was a routine procedure in 2004 and 2005 and added considerable delays.

Anbar Awakening and the Surge

According to an international research group, Sunni insurgents from Anbar and foreign Sunni al-Qaeda fighters formed a strategic and tactical alliance against what was perceived as a U.S. military occupation. Anbar residents provided local knowledge, logistics, and personnel to al-Qaeda leaders attacking Coalition Forces. However, opposition to al-Qaeda grew as the group increasingly targeted Sunni tribal leaders for assassination and began taking control of money-making activities traditionally held by local tribes.⁵⁷

It is difficult to identify the exact date or event that precipitated a change, but as early as 2005, local tribal leaders began establishing alliances with the U.S. military against al-Qaeda. In September 2006, an Iraqi-led coalition of Sunni tribal leaders publicly acknowledged their split from al-Qaeda and began working with the U.S. military to drive the insurgents out of Anbar province.⁵⁸

In January 2007, the U.S. military increased its forces in Iraq. A series of offensive operations focused on expanding the gains achieved in the preceding months in Anbar province. As Figure 5 indicates, by mid-2007, the number of attacks in the province was at its lowest point since 2004.

Yet, while violence as a whole was down considerably in Anbar province, violent incidents against this project did not let up. In 2007, a Corps briefing chart identified growing security concerns in the area. Specifically, the briefing chart stated, "local security situation – contractors threatened/ambushed/murdered, Title II Contractor offices ransacked, PSD [personal security detail] staff murdered on mission, Vendors refuse to deliver to Falluja..." During 2007, at least five of 17 contractors stopped work due to security concerns.

⁵⁷ John A. McCary, "The Anbar Awakening: An Alliance of Incentives," *The Washington Quarterly* (Center for Strategic and International Studies), 1/2009.

⁵⁸ Ibid.

2008–Present

Security vastly improved in all of Anbar province, including Falluja, in 2008. However, the area is still very dangerous. In May 2009, three U.S. reconstruction officials returning from the Falluja wastewater treatment plant were killed by an IED.

Even though security has improved since mid-2007, contractors continue to face intimidation and threats, and U.S. reconstruction officials cannot visit project sites with the frequency and duration needed to fully manage a project of this magnitude and importance.

Unrealistic Project Cost Estimates and Completion Time Frames

According to U.S. officials, extremely poor security conditions prevented them from visiting the proposed wastewater treatment plant site prior to awarding the contract. However, at least one, if not several, site visits are critical to adequately assess site conditions for construction. At the time of the contract award, the program office knew only that sewage was flowing in Falluja’s streets.

The inability to visit the project site led to unforeseen construction issues that, in turn, caused delays and higher costs. To illustrate, the contractor’s network design included areas of deep trenching but U.S. officials were not aware of the high water table, which should have been considered in the project’s design. Nevertheless, the designs were approved. When construction began, excavated areas throughout the city would flood overnight and have to be pumped out before construction could resume. Due to possible cave-ins at excavation sites, expanded excavation was required. Additionally, because there were no early site visits, FluorAMEC was unaware that the site contained unexploded ordnance until it arrived at the location. This resulted in construction delays as the Marines had to first clear the site before the contractor could start construction.

U.S. officials stated that internal pressures led to unrealistic total project cost estimates and completion time frames. According to one official, the U.S. government wanted to quickly rebuild Iraq; consequently, the program office was told to obligate money quickly. However, from the time PMO arrived in Iraq, it was behind schedule in obligating reconstruction funding. PMO officials stated the emphasis became obligating money quickly. As a result, PMO did not prepare comprehensive project cost estimates. On June 25, 2004, the day before the contracting office awarded the task order to FluorAMEC, it prepared a total project cost estimate of \$35,385,868—an amount almost identical to the \$35 million in funding available for this project. U.S. officials said that the \$35.3 million total project cost estimate was done to justify FluorAMEC’s task order.

One U.S. official stated that if “you take all the original PIFs [Project Identification Forms] for projects in Iraq and look at them now, they will all be way off.” A September 2005 GAO report confirmed this. GAO reported that the CPA’s initial assessments for the water sector had underestimated water-project costs by 25% to 50%.⁵⁹ In the case of the Falluja Waste Water Treatment System project, the discrepancy was even larger. For example, in March 2005, FluorAMEC estimated that the project would cost at least \$51.3 million, and that amount would fund only a limited portion of the project.

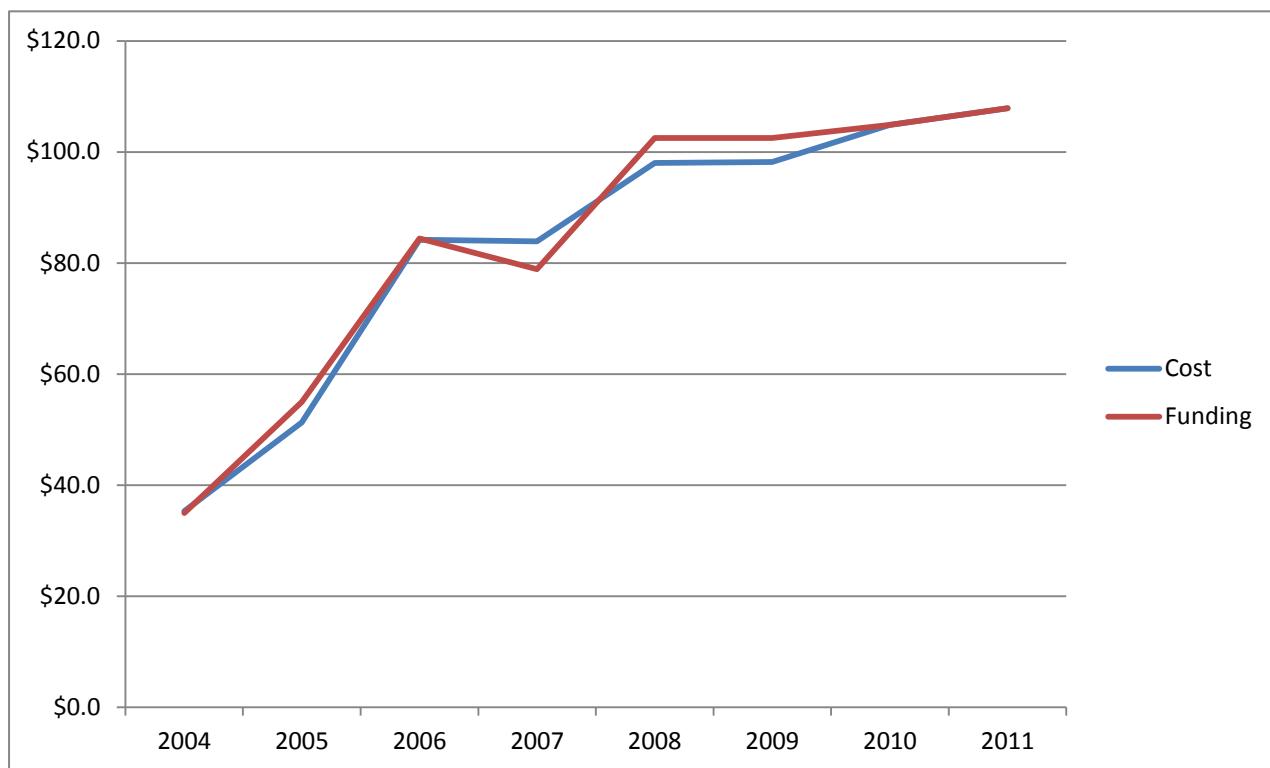
⁵⁹ GAO Report GAO-05-872, *Rebuilding Iraq: U.S. Water and Sanitation Efforts Need Improved Measures for Assessing Impact and Sustained Resources for Maintaining Facilities*, 9/2005.

In addition, former U.S. officials stated that completion time frames were similarly unrealistic. The original task order required FluorAMEC to complete the entire system within 3½ years. However, as previously mentioned, the U.S. government wanted to quickly rebuild Iraq, so prior to issuing the task order, it accelerated the required completion time to 18 months (February 2006). Yet, because Falluja's security conditions did not allow for starting construction until early 2005, FluorAMEC had less than one year to complete the project.

Funding Varied

From June 2004 through September 2011, the projected cost of this project increased based upon the amount of funding available and the associated changes in project scope. Figure 7 shows the relationship between the funding available and the project's cost growth.

Figure 7—Graph Comparing Funding to Cost Growth (\$ in millions)



Note:

By September 2011, the U.S. government had utilized four funding sources to award 42 individual contracts and grants, worth approximately \$107.9 million (see Table 1).

Source: SIGIR review of Corps briefing charts 2006-2009 and ISPO documentation.

SIGIR found that the projected completion costs varied significantly over time without explanation. For example, the Corps' April 2006 briefing charts provided four options for completing the project. Each option contained specific features (such as the number of collection lines, trunk lines, pump stations, and wastewater trains) and the associated cost. Full build-out was estimated to cost \$112.2 million and would require the construction of all collection lines, trunk lines, pump stations,

and a four-train facility (that is, the original project scope). However, three months later, the Corps stated that full build-out would cost \$140 million. The Corps' briefing charts provided no rationale for the \$27.8 million increase in just three months. In July 2006, the U.S. government favored the "Baseline Plus" option, which was listed at \$76.3 million. Yet, in August 2006, the project costs increased to \$84.24 million.

SIGIR requested the underlying support for these completion estimates from the Corps; however, at the time of this report, SIGIR had not received this information.

Lack of Adequate Funding

On June 21, 2004, the PCO Director requested that the Department of the Army release \$35 million to execute the Falluja project. Former U.S. officials involved with this project stated that, from their past experiences with the CPA, the CPA often married individual projects with available funding and, in their opinion, this project was no exception. Awarding this type of project based on available funding, instead of a comprehensive project cost estimate meant that the CPA started the project without knowing if there was adequate funding to complete it. A comprehensive, detailed total project cost estimate, based on actual field conditions, would have alerted the program office that this project would require considerable additional funding to complete even a portion of the work. However, the PMO's cost estimate significantly underestimated project costs, which led the CPA to not seek additional funding for the project or limit the project's scope.

In March 2005, FluorAMEC notified the program office that it would not be possible to construct a sewer network system within the budgeted amount of \$35 million. Instead, FluorAMEC recommended constructing only a fraction of the project at almost double the cost (\$51.3 million). By this time, however, the program office did not have additional funding in place to cover the increased project cost. In 2005, a strategic review cut \$2.2 billion from the water sector, which further limited the amount of funding available to complete existing water sector projects.⁶⁰

The lack of adequate project funding required the program office to de-scope a significant portion of this project while trying to fund the approved work piecemeal and only as limited funding became available.

Additional Funding Sources

By mid-2005, IRMO decided to continue the project but recognized that the U.S. government would not be able to fund the entire sewer network system. During the second half of 2005 and early 2006, IRMO identified additional funding to complete a portion of the project. The funding included \$18 million from the DFI, \$9 million from CERP, and additional IRRF funds reprogrammed within the IRRF water sector budget. By August 2006, the program office had allocated a total of \$84.4 million to the project.

DFI Issues

In December 2005, then-Minister of Finance, Allawi, authorized the program office to allocate \$18 million in DFI funding for the Falluja project and extended the original DFI program to the end of

⁶⁰ SIGIR, *Hard Lessons: The Iraq Reconstruction Experience*, Washington, DC: Government Printing Office, 2009.

2006. Between February and August 2006, the program office awarded 11 contracts, in the amount of approximately \$15.6 million, in support of the project.

Originally envisioned as a major financial resource for this project, the DFI funding ultimately became a significant obstacle. By August 2006, the Ministry of Finance was not paying DFI contractors for work performed. The ministry rejected invoice packages for payment, according to program office representatives, regardless of the content or presentation of those packages. Further aggravating the problem was that the ministry would not identify exactly what was required for payment. This had a direct impact on project status.

By October 2006, the Corps' field representatives reported that "2 more contractors in Falluja...have stopped work" because they had not been paid. As a result, some of the DFI-funded construction work ceased, and some of the equipment procurement contractors refused to execute their contracts. The subsequent work stoppages and lack of equipment affected progress on the IRRF- and CERP-funded contracts.

By mid-2007, the situation with the DFI-funded contracts became untenable. Four construction contractors had outstanding invoices in excess of \$3 million. In December 2007, the contracting office terminated the DFI contracts and awarded new contracts for the remaining work using additional IRRF funding. However, the IRRF funding could not be used to pay outstanding invoices. As of August 2008, five DFI contracts had outstanding balances of \$2,331,532.⁶¹ From the summer of 2006 through 2009, this project experienced significant construction delays due to the ministry's non-payment of DFI-funded contracts.

Constantly Evolving Scope of Work

The lack of adequate initial funding resulted in program office officials trying to accomplish as much of the original project scope as possible with the amount of available funding. The program office constantly adjusted the project's scope to match the funding available at the time.

In March 2005, the program office realized it did not have the funding to complete the original project scope. Over the next 32 months, program office officials created countless briefing charts and memoranda documenting alternative project scope and cost proposals. For example, in April 2006, the Corps provided four project scope options: Baseline, Option 1, Option 2, and Full Build Out. The costs associated for each option ranged from \$55.5 million to \$112.2 million. Yet, a way forward was not selected because the program office was constantly chasing additional funding sources to complete the largest amount of project scope possible. To illustrate, in April 2006, the program office had \$55.3 million in available funding. This amount was sufficient to select and implement the Baseline option. Rather than doing so, the program office focused on finding additional funding sources to increase the project's scope. As a result, it did not agree to a project scope until November 2007.

The program office encountered multiple challenges attempting to complete the November 2007 project scope—contractor underperformance, difficult site conditions, limited access to sites, and complexity of house connections. In an October 2008 inspection, SIGIR identified several shortfalls of the current project scope, including a lack of house connections, consumables, and training.⁶² The

⁶¹ SIGIR PA-08-144-148, *Falluja Waste Water Treatment System, Falluja, Iraq*, 10/27/2008.

⁶² SIGIR PA-08-144-148, *Falluja Waste Water Treatment System, Falluja, Iraq*, 10/27/2008.

program office changed the project scope in 2009 to complete an expandable “back-bone” system, which decreased the number of homes within the three collection areas and reduced the number of trunk lines. In 2010, the program office utilized a fourth funding source, the ESF, to provide 9,116 house connections and fund a future operations and maintenance training program.

Changed Contracting Strategies Further Delayed and Increased Construction Costs

In 2004, the CPA contracting strategy was to enter into very large open-ended contracts called design/build contracts. Design/build contractors were awarded indefinite delivery/indefinite quantity cost-plus contracts for design, engineering, and construction work in sectors, such as water, electricity, and oil. The original design/build contracts were broad contract documents with large spending caps. For example, FluorAMEC’s design/build contract for public works/water projects in the north had a \$600 million ceiling. As projects were approved, the CPA awarded task orders against these broad contracts for the construction of specific facilities. The CPA awarded the Falluja Waste Water Treatment System project as a task order against FluorAMEC’s larger design/build contract. Over time, this strategy changed to address the problems associated with huge and costly design/build contracts. In so doing, however, new problems were created.

New Execution Strategy—Iraqi First

In mid-2005, the U.S. government moved away from large design-build contracts because most projects ended up over budget and behind schedule.⁶³ Consequently, the program office de-scoped the FluorAMEC task order in July 2005. In place of the design-build model, the program office initiated the “Iraqi First” program, which sought to encourage Iraqi economic expansion, entrepreneurship, and individual development. The hope was that Iraqi contractors would rebuild the country by procuring supplies and services locally.

In support of the Iraqi First program, the program office decided to break up the project into separate components and award a large number of contracts to Iraqi contractors capable of working in Falluja. Eventually, the program office awarded 42 contracts for engineering design support, construction, and equipment procurement. Breaking down the project into a large number of small- and mid-sized contracts was proposed for several reasons. First, the project office was uncertain how much of the planned project could actually be constructed with the available funding. As such, the project was divided into a set of severable components that, as funding became available, were purchased. In addition, in 2006, the program office was utilizing three separate funding sources—the IRRF, CERP, and DFI—that could not be mixed. Because each funding source varied in size, the components needed to be severable and of varying sizes. Finally, because the DFI funds were authorized for only 2006, all DFI-funded activities had to be completed that year.

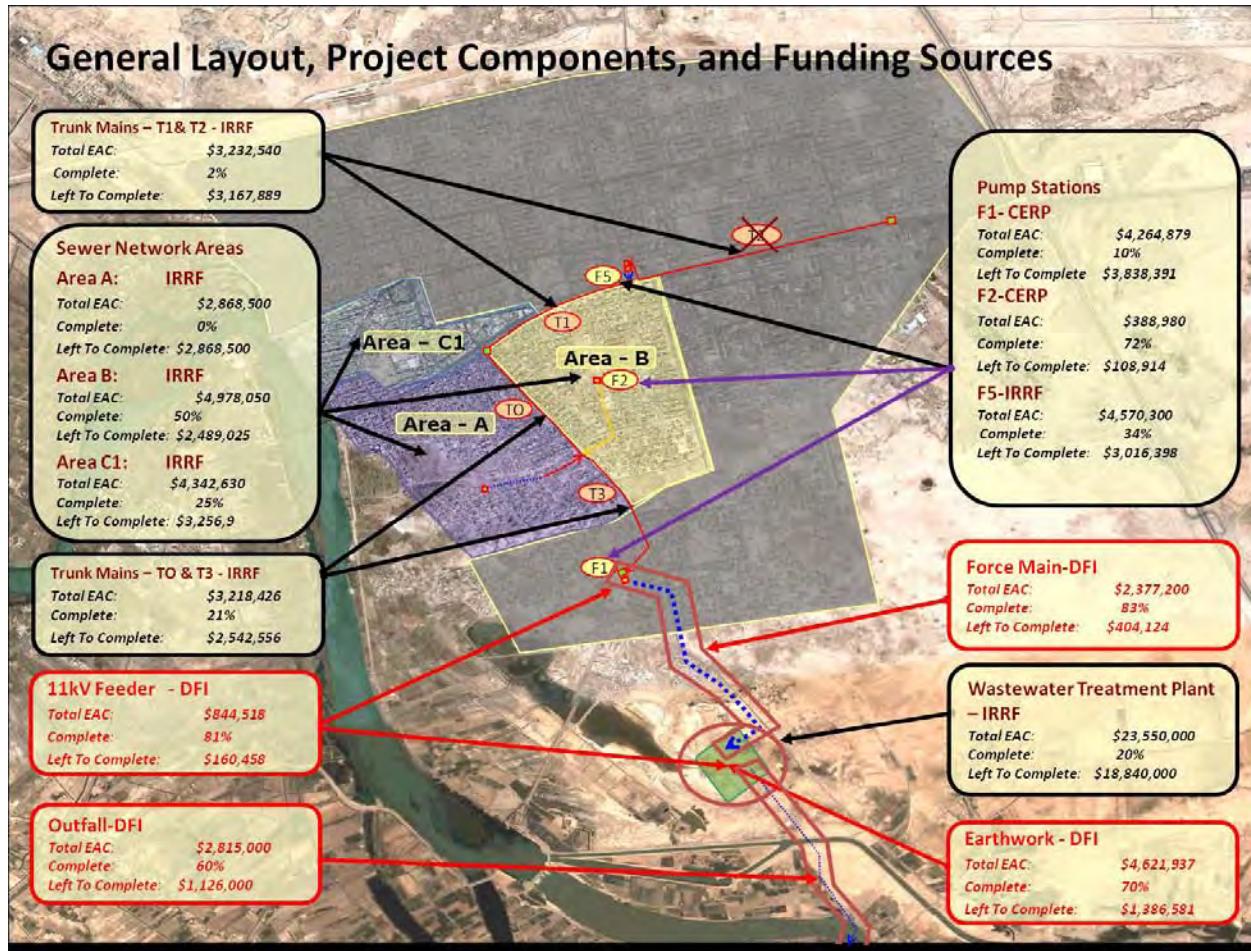
Even though there was rationale for dividing the project into a number of components for execution, the segmentation of the project created complex interdependencies. Some of the contracts, such as the earthworks at the wastewater treatment facility, needed to be completed before construction of the plant could commence. In addition, some of the key equipment for the project was purchased separately from the construction contracts. As a result, failure to execute certain contracts adversely

⁶³ SIGIR, *Hard Lessons: the Iraq Reconstruction Experience*, Washington, DC: Government Printing Office, 2009.

impacted other contracts and then eventually the project overall. For example, the Ministry of Finance's refusal to pay DFI-funded contract invoices in late 2006 resulted in work stoppages of critical path construction contracts. Specifically, the earthworks contractor left the project site over the non-payment of more than \$1.3 million in invoices, which delayed the start of the construction of the facility.

Figure 8 illustrates the complexity of this project in terms of interdependence between only the construction contracts while also identifying the multiple types of funding sources (as of October 2008).

Figure 8—General Layout, Project Components, and Funding Sources



Source: From USACE briefing chart, 2008.

Limited Oversight of Contractors

In addition to creating complex interdependencies, the segmentation of the project and the award of individual contracts required construction throughout the still very dangerous city. A former Gulf Region District commander stated that it made no sense to award a contract and require the contractor to begin construction throughout a city that was not secure. In addition, the program and contracting offices did not have sufficient numbers of staff to provide the necessary oversight of inexperienced

Iraqi contractors. To illustrate, because of security and an insufficient number of staff, the program and contracting offices did not visit specific areas of Falluja, so they provided no oversight of the construction activities occurring in those locations. The former Gulf Region District commander stated it would have made more sense to concentrate efforts in completing one portion of the project at a time. For example, the contracting office could have awarded the contract for the wastewater treatment facility first. It would have been easier to provide security for one specific area in order to complete construction, rather than worrying about dozens of construction projects at a single time.

Final Project Scope and Cost Decisions Delayed

From August 2006 through March 2007, U.S. officials discussed several different funding proposals and alternative options for the overall system. Between January 2007 and October 2007, at least 20 separate briefing charts, information memoranda, decision briefs, and emails were created to provide four potential courses of action. But the program office still had not made a decision. The ITAO Senior Consultant for Water expressed her frustration by stating the “decision is in fact long overdue and I don’t think it should languish any longer.”

In November 2007, more than 3½ years after the contracting office awarded the design/build task order to FluorAMEC, and two years after agreeing to the type of system to be built, the program office secured enough funding to define the ultimate project scope. With approximately \$97 million from various funding sources, the program office decided to construct a “back-bone” system, which included a four-train wastewater treatment facility, three pump stations, three trunk lines, and three collection areas (with no house connections).

Lack of Communication with Appropriate GOI Reconstruction Officials

According to the Ministry of Municipalities and Public Works⁶⁴ representatives, the GOI’s original request for a sewer network system included a mechanical sludge process wastewater treatment facility. During the Oil for Food program, the GOI purchased 10 compact mechanical sludge units, intending to utilize those units for newly constructed wastewater treatment plants around the country. However, from the start of this project, the CPA wanted a different type of treatment system—known as a lagoon system—because it was less expensive to construct, required less power to operate, had lower operation and maintenance costs, and required minimal labor. Consequently, FluorAMEC’s task order identified the type of system to be built as an “oxidation lagoon”-style wastewater treatment facility. The CPA advised FluorAMEC that, in the 1980s, a local Iraqi consulting firm conducted a geotechnical investigation of Falluja and prepared a wastewater treatment plant and sewer network design for the city. In an effort to reduce costs, the CPA recommended that FluorAMEC use this information for the preliminary design. The local Iraqi consulting firm’s design included a lagoon-system treatment plant, which FluorAMEC incorporated into its design.

FluorAMEC’s task order included a requirement to meet with Falluja engineers, local government public works officials, and consultants “familiar with the city’s needs.” However, according to a former program office official, a significant problem was that “you couldn’t always identify who [within the GOI] was in charge.” The two most prominent players for this project were the Falluja

⁶⁴ The Ministry of Municipalities and Public Works is responsible for the delivery of safe drinking water, environmental sanitation (wastewater and solid waste) services, urban development, municipal road work, and public land management.

Reconstruction Council, with Sunni representatives, and the Ministry of Municipalities and Public Works, with Shia representatives from Baghdad. The former program office official stated there was deep-rooted animosity between the local council representatives and ministry officials because of their different religious affiliations that led to major disagreements about the project.

Project file documentation included emails in late 2004 between U.S Marine units stationed in Falluja and program office personnel. One email stated “Go with the oxidation pond [lagoon system]. That is what the locals have asked for.” While not explicitly stated, it appears the “locals” referred to in the email was the Falluja Reconstruction Council. The Falluja Reconstruction Council was responsible for assessing and addressing the city’s needs and proposing potential projects, while the ministry was responsible for approving the design and construction of all new water and sanitation projects in Falluja.

Ministry representatives stated that U.S. officials never identified the type of sewage treatment plant to be constructed. Because the GOI requested the project, the ministry assumed it would be a mechanical sludge-process system. According to a former program office official, the program office “probably did not consult with” the ministry prior to deciding upon the lagoon system. As a result, the ministry did not become aware that FluorAMEC was designing a lagoon system until August 2005, more than 14 months after the start of this project. The ministry immediately rejected the lagoon system, instead proposing the use of four compact mechanical sludge units. SIGIR asked ministry representatives why they rejected a lagoon system since it was based upon an existing Iraqi design. Ministry representatives stated the GOI never approved the local Iraqi consulting firm’s original design due to “significant design problems.” The program office ultimately agreed to change the design to a mechanical sludge system, however, this required a comprehensive redesign of the system, which significantly increased the cost of the project and extended the completion time frame.

Falluja’s Tribal Customs Further Delayed Construction

According to a Department of Defense study, “Tribes are perhaps the oldest, most enduring and controversial social entities in the Middle East...A tribe is a social structure consisting of a number of families, clans, or other groups who share a common ancestry (real or perceived) and culture...The tribe provides protection, representation, and a sense of identity for its members...Tribes have played a central role in the history of Iraq for thousands of years and continue to do so today.”⁶⁵ The population of Anbar province, and its two largest cities, Ramadi and Falluja, is known for its strong tribal and religious traditions.⁶⁶

Fallujans did not easily accept or allow outsiders to come in. This attitude is not only directed at Coalition Forces, but also at any Iraqis who are not specifically from Falluja.⁶⁷ This project witnessed the volatile tensions that exist between residents of Falluja and “outsiders.” The program office awarded a contract to construct a pump station to a Baghdad-based contractor. While departing from a Pre-Construction Meeting in Falluja, three of the company’s engineers were ambushed; two engineers were killed and the third was seriously wounded. The message was that outsiders were not welcome

⁶⁵ Global Resources Group, *Iraq Tribal Study–Al-Anbar Governorate: The Albu Fahd Tribe, The Albu Mahal Tribe and the Albu Issa Tribe*, 6/18/2006.

⁶⁶ Department of the Navy, United States Marine Corps, *U.S. Marines in Iraq, 2004-2005: Into the Fray*, History Division, U.S. Marine Corps, Washington, D.C., 2011.

⁶⁷ William F. Mullen III, “Turning Fallujah,” *Small Wars Journal*, 2009.

to work in the city—even if they were attempting to help construct a wastewater treatment system for the city’s residents.

As a result, the program office was left with few options other than to award all of the contracts to local contractors and subcontractors. However, the CPA noted in its original project justification that the city of Falluja had never had a comprehensive sewer system; therefore, it was unrealistic to expect to find local contractors capable of building such a system. The program office found a very limited pool of inexperienced contractors capable of working in Falluja from which to select. Former Corps officials stated there were continuous quality issues due to “cheap and inexperienced subcontractors and general inexperience on structures of this size and complexity.” Each quality issue added to construction delays. Further, former Corps officials stated that most contractors and subcontractors associated with this project did not have the required technical capabilities to perform complex and dangerous work, such as excavation and shoring. This placed a great burden upon Corps officials to mentor and monitor the safe use of equipment and other safety practices unknown to the contractors and subcontractors of Falluja. During the course of this project, there were four fatalities due to construction activities. Each fatality increased construction delays as the program office issued a Stop Work Order and ordered an investigation to determine the cause of the accident and the necessary corrective actions.

Major Changes in Project Direction Occurred in 2008

In 2008, the Ambassador became “extremely concerned” that the Falluja Waste Water Treatment System had “gone so far off track and for so long.”⁶⁸ The Ambassador was concerned not only with the costs, timeliness, and extent of the project, but also with the adequacy of progress reporting. In July 2008, the Ambassador requested SIGIR perform an audit and inspection of the project. In October 2008, SIGIR’s audit report addressed the adequacy of progress reporting⁶⁹, while the inspection report addressed the project’s costs, timeliness, and the extent of construction.⁷⁰

SIGIR’s audit report identified shortcomings in the Department of State’s communication avenues for ensuring the Chief of Mission receives information critical for decision-making on reconstruction projects and made recommendations to correct the shortcomings. In a SIGIR inspection report we raised significant sustainability issues for both the U.S. government and GOI. Specifically, the Ministry of Municipalities and Public Works did not have funding to complete the house connections; provide fuel for generators at the wastewater treatment plant and pump stations; provide essential consumables, such as polymer and chlorine; and several DFI-funded contractors had outstanding balances. SIGIR recommended the U.S. government coordinate with the GOI to resolve these issues in order to protect the U.S. government’s investment in the project. The U.S. Embassy-Iraq concurred with the recommendations of SIGIR’s audit and inspections reports. In the words of one program official, the SIGIR reports “were critical to this project’s turnaround because they shined a bright light on the problems that needed to be addressed.” The SIGIR reports resulted in additional resources, both monetary and personnel, being made to the project.

⁶⁸ SIGIR_PA-08-144-148, *Falluja Waste Water Treatment System, Falluja, Iraq*, 10/27/2008.

⁶⁹ SIGIR Audit 09-007, *Improvements Needed in Reporting Status of Reconstruction Projects to Chief of Mission*, 10/29/2008.

⁷⁰ SIGIR PA-08-144-148, *Falluja Waste Water Treatment System, Falluja, Iraq*, 10/27/2008.

Completion of a Back-bone System

In 2009, this project languished to the point where the U.S. officials held serious discussions about the desire to complete the project or simply turn the project over to the GOI to complete. At the time, the wastewater treatment plant was still under construction, deep excavation holes still existed throughout the city and another contractor was hired to dig more holes, and the GOI did not appear to have the capacity to either complete or sustain the project.

In an effort to turn this project around, the Corps advocated a two-phase approach. First, the Corps Gulf Region District commander did not understand the decision to put more holes in the city instead of completing the existing work to make the project operational. The commander terminated the contract for new excavation; instead he focused on completing the existing work. In addition, the Corps advocated completing an expandable “back-bone” system, consisting of the wastewater treatment facility, three pump stations, two trunk lines, Collection Areas A, B, and C, and house connections to approximately 9,000 homes. The Corps believed this reduction of scope provided the best likelihood of completing the project and providing the GOI with the backbone of the system on which they could expand to cover more areas in the future.

Further, the Corps worked with the Department of State and the GOI about the issue of house connections. The Corps believed house connections were critical to the success of this project; without house connections, everything else built would be useless. The Corps did not believe it could provide the necessary oversight of connecting the houses to the system, because that would require it to go deep inside neighborhoods and into individual homes. Even though security had improved considerably by 2009, Falluja still had some very dangerous areas. Instead, the Corps recommended that the Department of State award a grant to the GOI for the house connections. This would make the GOI responsible for overseeing the contractor’s work. On March 19, 2010, the Department of State awarded the grant in the amount of \$4,558,000, to connect 9,116 houses in Collection Areas A, B, and C. As of September 2011, about 6,000 houses were connected.

The Waste Water Treatment Plant Grand Opening

On May 2, 2011, the city of Falluja held a ribbon-cutting ceremony for the wastewater treatment facility. Several Iraqi dignitaries and local leaders attended the ceremony, which was covered by at least 10 Iraqi television and radio channels (see Figure 9). According to a Corps representative, the opening of the plant was considered an important milestone for the city of Falluja. Ministry representatives stated that a functioning sewer network is a status factor for cities in Iraq.

Further, ISPO officials met with ministry officials regarding a solution to the fuel problem for the wastewater treatment plant and pump stations. In July 2011, the Ministry of Electricity connected the wastewater treatment plant to the Anbar essential services line, which provides the plant with approximately 20 hours of electricity per day.

After the grand opening, the facility began processing the first wastewater from the connected homes. Due to the limited number of houses connected to the facility, only one of the four sewage treatment lines is currently needed. However, the plant operators are not properly treating the sewage because they have not been trained in using the required consumables, such as polymer and chlorine. The Department of State recently awarded a contract to train the plant’s operators in using such products, as well as to provide on-the-job training on the plant’s equipment and routine maintenance. The

Department of State hopes that this contract will help in developing the GOI's capacity to operate wastewater treatment plants throughout Iraq.

Figure 9—Ribbon-cutting ceremony



Source: USACE photograph May 2011.

GOI To Expand the System

As recommended in the SIGIR inspections report, ISPO officials engaged its ministry counterparts and encouraged them to not only plan to sustain the project, but to complete the entire project as originally intended. According to program officials, the CPA helped establish this ministry in 2004, but in the beginning, the ministry was not very effective. According to officials, the ministry has improved over the years. In addition, the GOI has significantly increased the ministry's funding for both operations and new projects. As a result, the ministry has grown in capacity to provide the consumables necessary to properly operate the wastewater treatment plant.

Further, in October 2010, the Ministry of Municipalities and Public Works proposed to the Department of State that if it funded the completion of two trunk lines at a cost of \$3.03 million, the ministry would fund the remainder of the network system (full build-out). The Department of State agreed to the ministry's cost-sharing proposal and awarded a modification to the existing house connections grant to cover the cost of the two trunk lines. Ministry representatives said that the GOI has committed \$87 million to complete the remainder of the project, which they anticipate will be completed in 2014.

Project Impact Is Unknown

The primary purpose of this project was to provide Falluja with a wastewater treatment system that would service 100,000 residents. However, the project also had multiple secondary goals including building the capacity to deliver essential services, winning the hearts and minds of the people, and stimulating the economy by boosting employment (particularly for young men). SIGIR's review found that, at present, about 6,000 homes have been connected to the system⁷¹, and a structure has been put in place that will allow expansion of the system to thousands of other homes. However, measures of success were not established for the secondary goals and it is not clear if they have been met.

Secondary Impacts of Project Not Measured

SIGIR found no evidence that anyone has attempted to measure the impact of this project against its secondary goals. This project was identified as a “carrot” to stabilize the local population, and several program office and Corps officials stated that this project was awarded to “win the hearts and minds” of the Iraqis. However, its actual impact remains largely unknown.

What is known is that for the first two years of this project, violent incidents within Anbar province increased dramatically. At the start of the project, Anbar province experienced 719 violent incidents (per quarter); however, this number continually increased to a peak of 4,365 (per quarter) in late 2006. The incidents between 2006-2007 included hijackings, kidnappings, murder, theft, and extortion. In late 2007, security began to improve, and the number of violent incidents dipped below the early 2004 levels. The cause or causes of the dramatic reduction in violent incidents post-2007 are varied and debatable. The Anbar Awakening and the “surge” of additional U.S. troops to the province are largely credited with the increase in security. While this project did provide employment for local Fallujans, it also provided insurgents and criminals with targets for attack.

Similarly, SIGIR found no information on whether the project has impacted local residents’ feelings towards their government, either local or national. From a local perspective, this project was to show Falluja residents its government had the capability to provide an essential service, while from a national perspective, this project was identified as a “national reconciliation” project meant to ease tensions between Sunnis and Shi’as. At this time, it is unknown whether Falluja residents feel better about their local government’s capability to provide an essential service.

⁷¹ According to the International Organization for Migration, the average Iraqi household is estimated to have about 6.4 people. Thus, 6,000 homes would be about 38,400 residents.

Conclusions and Lessons Learned

Conclusion

After seven years and the expenditure of over \$100 million dollars, the backbone of a wastewater treatment system is now in place, which is currently servicing approximately 38,400 residents. But this is far short of the 100,000 residents originally intended to benefit from the system. Despite this shortfall, the wastewater treatment plant has been completed and has the capacity to provide service to 200,000 residents; the network system is expandable, and with additional investment by the Iraqi government, tens of thousands of additional residents could be connected to it. SIGIR notes that the Iraqi government is now supporting the system's current operation and its future expansion. But completion of the existing backbone system was years late and millions of dollars over budget, leaving Falluja's streets torn up and in disrepair for years. Many people, including U.S. State Department personnel, died while working in support of this project.

Assessing the Falluja Waste Water Treatment System solely on its excessive costs and limited results may not fully realize the nature of its secondary goals and objectives. Wartime projects generally have secondary goals that shape management decisions made along the way. This project had the secondary goals of enhancing local citizens' faith in their government's ability to deliver essential services, building a service capacity within the local government, winning the hearts and minds of a critical segment of the Iraqi populace, and stimulating the economy by boosting employment (particularly for young men who were potentially recruitable by the insurgency).

This project was taken on in 2004 in a city wracked by violence. Little planning went into the project, and there was minimal understanding of site conditions, no skilled workforce available, and no clear idea about how much the new system would cost. Very early in the project, security conditions rapidly deteriorated such that the trenches and pipes laid by the U.S. contractor were regularly being blown up and construction workers were subject to continual attacks. On several occasions, U.S. combatant commanders had to direct the contractor to stop construction until security improved. So many adverse conditions faced this project from the outset; thus, it is hard to understand why it was initiated and continued.

The absence of information or analysis on whether progress was made toward achieving any of the secondary goals makes an assessment of this project's worth or wisdom quite difficult. In the end, it would be dubious to conclude that this project helped stabilize the city, enhanced the local citizenry's faith in government, built local service capacity, won hearts or minds, or stimulated the economy. Coupled with the fact that the outcome achieved was a wastewater treatment system operating at levels far below what was anticipated, it is difficult to conclude that the project was worth the \$100 million investment and the many lives lost.

Lessons Learned

A lesson learned identified in the book *Hard Lessons: The Story of Iraq Reconstruction*, is appropriate to the Falluja project.

A successful reconstruction program requires a balancing of security, political, and economic interests. Reconstruction cannot proceed on a large scale without the requisite security to protect those carrying out the projects and those overseeing them. In Iraq, the scope of reconstruction was too often unsupportable by available security resources. To this day, Iraq's reconstruction environment has never been truly "post-conflict." Endlessly resuming rebuilding in the wake of sustained attacks on reconstruction personnel and critical infrastructure, proved to be a demoralizing and wasteful strategy. In future stabilization and reconstruction operations, the U.S. government should analyze whether and at what costs security risks can be mitigated before proceeding with large-scale rebuilding projects. Such projects should begin only when senior leaders determine that the strategic objective they could fulfill outweighs the risk of failure and the costs of mitigating security risks.

Large-scale reconstruction projects often have secondary goals that could enhance their value. However, under these circumstances, managers need to be cautious that pursuing secondary goals does not cloud decision making about the efficacy of continuing these projects. When projects exceed their expected timelines by years, it is doubtful that the citizens awaiting the project will recognize any benefits beyond the project's completion and, in fact, may see the prolonged delays as evidence of incompetence or malfeasance on the part of the donor.

In addition, this case study demonstrates that for contingency operations involving a reconstruction program, the emphasis should not be on the obligation and expenditure of reconstruction funding; instead the emphasis should be placed on project planning, including performing regular risk assessments to determine the desirability of continuing construction of a particular project.

Management Comments and Audit Response

Because this report did not contain recommendations, neither the Department of State nor the U.S. Army Corps of Engineers was required to respond. However, both provided official comments on the draft report. The U.S. Army Central Command and U.S. Forces-Iraq also provided technical comments.

DoS concurred that the project faced many difficulties, but maintains that the Fallujah Waste Water Treatment Plant has made progress. According to DoS, in 2008 the project turned a corner, in no small part due to SIGIR's October 27, 2008 report. DoS worked collaboratively with USACE, developed a plan that was appropriate and achievable and forged ahead-with the firm objective of making the taxpayer's investment and the efforts of those who worked so diligently on this project worthwhile. SIGIR agrees with DoS's comments. However, SIGIR makes two points in this report. First, unquestionably the final outcome of this project fell far short of plans raising questions about initiating such large-scale projects during a conflict. If the project had strategic goals that overrode the goal of constructing a sewage treatment plant, those goals were neither identified nor tracked and thus the value of this \$107 million dollar investment is questionable.

The second point is whether large-scale infrastructure projects are appropriate vehicles for pursuing secondary goals. Managers need to be cautious that the pursuit of secondary goals does not cloud decision making about the efficacy of continuing these projects. As SIGIR said in the report, when projects exceed their expected timelines by years, it is doubtful that the citizens will recognize any secondary benefits and, in fact, may see the prolonged delays as evidence of incompetence or malfeasance on the part of the donor.

USACE concurred with the report and provided technical comments that we included in the report as appropriate.

Appendix A—Scope and Methodology

Scope and Methodology

In August 2010, the Special Inspector General for Iraq Reconstruction (SIGIR) initiated Project 1018 to examine the Falluja Waste Water Treatment System project. SIGIR's objectives for this report were to determine why the Waste Water Treatment System project took seven years and cost \$107.9 million to partially complete, and whether the project achieved its construction goals. This report was performed by SIGIR under the authority of Public Law 108-106, as amended, which also incorporates the duties and responsibilities of inspectors general under the Inspector General Act of 1978. SIGIR conducted its work during the period April through October 2011 in Baghdad, Iraq and Arlington, Virginia.

To determine why the Waste Water Treatment System project took seven years and cost \$107.9 million to partially complete, we requested documentation from program and project management, including contract listings with obligations and disbursements, cost estimates and underlying support, periodic briefing presentations, descriptions of the project scope, estimates to complete and various other project documentation including emails, memoranda, and letters from project files. We reviewed this documentation to understand the scope and estimated cost of the original project, major events that occurred over the life of the project, changes in scope, the current status and the operational viability of the project going forward.

We also interviewed current and former program and project management officials, as well as representatives from the Government of Iraq (GOI), to gain an understanding of how this project was initiated, the scope of the project, events that caused delays, the outcome of the project, availability of electricity and consumables, and GOI's commitment to operate and maintain the project.

To determine whether the project achieved construction goals, we compared the original scope of the project to the project as completed. Through interviews with key program officials, we inquired about other strategic goals of the project and whether any analysis or studies were done to determine whether the project met strategic objectives.

We conducted the audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Use of Computer-processed Data

We did not use computer-processed data in this report.

Internal Controls

Because we did not review any individual contract, but rather a group of contracts over the life of the Waste Water Treatment System project, we reviewed the adequacy of program and project management.

Prior Coverage

We reviewed the following reports and publications by SIGIR and the U.S. Government Accountability Office.

Special Inspector General for Iraq Reconstruction

Improvements Needed in Reporting Status of Reconstruction Projects to Chief of Mission, SIGIR-09-007, 10/29/2008.

Fallujah Waste Water Treatment System Fallujah, Iraq, SIGIR –PA-08-144-148, 10/27/2008.

Key Recurring Management Issues Identified in Audits of Iraq Reconstruction Efforts, SIGIR- 08-020, 6/27/2008.

Hard Lessons: The Iraq Reconstruction Experience, 2/2009.

U.S. Government Accountability Office

Rebuilding Iraq, U.S. Water and Sanitation Efforts Need Improved Measures for Assessing Impact and Sustained Resources for Maintaining Facilities, GAO-05-872, September 2005.

Appendix B—Key Events for the Falluja Waste Water Treatment System Project

Month	Year	Description of Event
March	2004	Security contractors are attacked in Falluja. Four contractors are killed and their bodies hung from a local bridge spanning the Euphrates River.
April	2004	US Military launches Operation Vigilante Response to apprehend assailants and attack insurgent positions.
April	2004	GOI objects to the military efforts in Falluja. Reconstruction is developed as a strategy to stabilize Falluja.
June	2004	A Funding Request is approved for \$35 million for the Falluja Waste Water Treatment System.
June	2004	An Independent Government Estimate is prepared indicating the cost for the entire Waste Water Treatment System will be \$35.4 million.
June	2004	CPA Awards a \$28.6 million contract to FluorAMEC for design and construction of the Falluja Waste Water Treatment System. Term for design and construction is 3.5 years. The term is later changed to 18 months (no explanation as to why time frame was accelerated or who authorized it).
April–October	2004	Insurgents control Falluja. The US Marines suspend FluorAMEC's work.
November	2004	US Military launches Operation Al Fajr (Phantom Fury) to regain control of Falluja.
January	2005	FluorAMEC receives a Notice To Proceed for construction.
March	2005	FluorAMEC submits \$51.3 million cost estimate for a partial lagoon-based waste treatment system.
July	2005	FluorAMEC's task order is de-scoped by program office.
August	2005	MMPW rejects a lagoon-based treatment process system.
November	2005	USG agrees to a mechanical waste treatment system, which required the re-design of the WWTP facility.
December	2005	GOI agrees to contribute \$18 million in DFI funds toward the construction of the WWTS.
April	2006	USACE proposes four options for completion of a mechanical waste treatment system with cost estimates ranging from \$55.5 million for a "baseline" build-out to \$112.2 million for a "full" build-out. A new execution strategy is adopted of awarding contracts to Falluja-based contractors.
May	2006–2009	GOI failure to make payments on DFI-funded contracts causes construction delays and work stoppages.
October	2007	USG decides to terminate some DFI-funded contracts and re-award with CERP or IRRF.
November	2007	USG decides upon a final project scope.
October	2008	SIGIR report identifies DFI payment and GOI sustainability issues.
August	2009	USG proposes project scope reduction (completion of an "expandable" backbone system).

Month	Year	Description of Event
March	2010	USG provides a \$4.6 million grant to GOI for the connection of 9,116 homes to the WWTS.
October	2010	GOI proposes to fund build-out of remaining collection areas, pump stations, and home connections estimated at \$87 million if the USG completes two additional trunk lines (T1 & T2).
March	2011	USG provides an additional \$3 million grant to GOI to complete trunk lines T1 & T2.
May	2011	Ribbon-cutting ceremony for opening of the WWTP—wastewater collection lines are completed in 3 of 8 areas, and approximately 4,500 homes are connected to the system.
December	2011	Connections to another 4616 homes are completed/in process.

Source: SIGIR analysis of DoS and USF-I documents.

Appendix C—List of Contracts Associated with the Falluja Waste Water Treatment System Project

Iraq Relief and Reconstruction Fund (IRRF)

Contract Number	Contract Description	Costs through July 8, 2011	Estimate to Complete	Total Estimated Costs
W917BG-08-C-0062	Construction of 4,500 meters of trunk main to connect pump stations and collection systems to the plant.	96,963		96,963
W91GET-08-M-1215	Procurement of operations and maintenance equipment and tools necessary to run the FWWTS.	106,571		106,571
W917BG-06-D-0021	Construction of two bathroom buildings, one dining facility, a chlorine and polymer storage facility, and a workshop, including sidewalks and parking areas.	108,308		108,308
W91GET-08-M-1217	Procurement of operations and maintenance equipment and tools necessary to run the FWWTS.	185,000		185,000
W91GET-08-M-1216	Procurement of operations and maintenance equipment and tools necessary to run the FWWTS.	486,836		486,836
W917BG-06-C-0048	Construction of a 200m x 200m laydown yard for the receipt and storage of sewer piping and other materials for construction of the FWWTS.	572,125		572,125
W917BG-08-C-0037	Engineering, inspection, and reporting services during construction of the FWWTS.	1,582,073		1,582,073
W917BG-06-C-0213	Engineering, inspection, and reporting services during construction of the FWWTS.	1,589,654		1,589,654
W91GY1-06-C-0049	Construction of 4,500m of trunk mains connecting multiple pump stations and 5 collection systems to trunk main T0.	1,607,653		1,607,653

W917BG-10-C-0002	Construction of trunk main T0 from pump station F1 to manhole TO-17 and trunk main T3 to serve collection area A.	1,877,200	1,877,200
W91GY1-06-C-0005	Construction of collection system sewer lines in Area B.	2,634,888	2,634,888
W91GY1-06-C-0048	Construction of collection system sewer line repairs in Area A.	2,906,420	2,906,420
W91GY1-06-C-0003	Construction of trunk main T0 from pump station F1 to manhole TO-17 and trunk main T3 to serve collection area A.	3,169,977	3,169,977
W917BG-08-C-0083	Construction of collection system sewer lines in Area B.	3,201,494	3,201,494
W91GY1-06-C-0004	Construction of collection system sewer lines in Area C1.	3,400,777	3,400,777
W91GY1-06-C-0050	Construction and commissioning of pump station F5.	4,923,210	4,923,210
W914NS-04-D-0008	This is the original contract for the design and construction of the FWWTS based on a treatment method using oxidation lagoons. This contract was ultimately used for the design of the entire system and construction of the collection network in Areas A, B, and C1.	18,678,375	18,678,375
W91GY1-06-C-0047	Design, construct, and commission, a wastewater treatment plant consisting of four packaged wastewater treatment plants, pre-purchased by the MMPW, for the City of Fallujah.	29,554,766	29,554,766
W914NS-04-D-0007	Engineering and design services.	500,000	500,000
W914NS-04-D-0007	Engineering and design services.	899,902	899,902
W914NS-04-D-0007	Engineering and design services.	98	98
W91GDW-08-M-4015	Engineering and design services.	906,682	906,682
W917BG-06-D-0017		350,000	350,000
Subtotal		\$79,338,972	\$79,338,972

Commander's Emergency Response Program (CERP)

Contract Number	Contract Description	Costs	Estimate to Complete	Total Estimated Costs
W917BG-05-A-0022	Material supply including 41,728m of 100mm PVC pipe.	\$207,540		\$207,540
W917BG-05-A-0020	Material supply.	325,644		325,644
W917BG-05-A-0007	Material supply.	334,845		334,845
W917BG-05-A-0024	Material supply including 29,100 m of 200mm PVC pipe.	407,400		407,400
W917BG-05-A-0026	Material supply.	455,000		455,000
W917BG-05-A-0005	Material supply.	481,070		481,070
W917BG-05-A-0009	Material supply.	497,280		497,280
W917BG-07-C-0108	Material supply.	1,156,344		1,156,344
W917BG-06-C-0125	Construction and commissioning of pump stations F1 and F2.	7,461,609		7,461,609
Subtotal		\$11,326,732		\$11,326,732

Development Fund for Iraq (DFI)

DFIWAT-06-C-0003	Survey and geotechnical services.	\$32,500	\$32,500
W91GY1-06-M-0004	Phase II engineering services.	458,995	458,995
DFIWAT-06-C-0021	Material supply including 100mm to 800mm PVC pipe, 1100mm to 1400mm Glass Reinforced Pipe (GRP), manhole covers and fittings.	668,556	668,556
DFIWAT-06-C-0017	Construction of the FWWTP and pump station F1 11 kv feeder lines (electrical).	802,419	802,419
DFIWAT-06-C-0023	Construction of the FWWTS Force Main from the F1 pump station to the FWWTP.	1,886,349	1,886,349
DFIWAT-06-C-0024	Construction of a 1,000 mm GRP outfall pipeline between the FWWTP and the Euphrates River.	1,420,000	1,420,000
DFIWAT-06-C-0027	Construction of the FWWTP earthwork. The project includes the importation of over 300,000 cubic meters of soil backfill.	2,768,887	2,768,887
Subtotal		\$8,037,706	\$8,037,706

Economic Support Fun (ESF)

Contract Number	Contract Description	Costs through July 8, 2011	Estimate to Complete	Total Estimated Costs
W91GDW-10-P-4000	Engineering and design support services during construction of the FWWTS.	\$390,425		\$390,425
SNEAIR-10-CA-130	Construction to connect 9,000 homes to the FWWTS.	750,000	6,839,000	7,589,000
W91GDW-09-M-4045 TO SS-016	Engineering services.	180,000		180,000
Subtotal		\$1,320,425	\$6,839,000	\$8,159,425
Estimated Costs for Operations and Maintenance training contract			\$1,000,000	\$1,000,000
Total		\$100,023,835	\$7,839,000	\$107,862,835

Source: SIGIR's analysis of USACE and JCC-I contracts.

Appendix D—Acronyms

Acronym	Description
CERP	Commander's Emergency Response Program
Corps	U.S. Army Corps of Engineers and its Gulf Region District
CPA	Coalition Provisional Authority
DFI	Development Fund for Iraq
ESF	Economic Support Fund
IED	Improvised explosive device
IRMO	Iraq Reconstruction Management Office
IRRF	Iraq Relief and Reconstruction Fund
ISPO	Iraq Strategic Partnership Office
ITAO	Iraq Transition Assistance Office
GOI	Government of Iraq
PCO	Project and Contracting Office
PMO	Project Management Office
SIGIR	Special Inspector General for Iraq Reconstruction
U.S.	United States
USACE	U.S. Army Corps of Engineers
USF-I	United States Forces—Iraq

Appendix E—Audit Team Members

This report was prepared and the audit conducted under the direction of Glenn D. Furbish, Assistant Inspector General for Audits, Office of the Special Inspector General for Iraq Reconstruction.

The staff members who conducted the audit and contributed to the report include:

Richard Kusman

Kevin O'Connor

James Shafer

Appendix F—Management Comments



United States Department of State

Washington, D.C. 20520

October 27, 2011

MEMORANDUM

TO: SIGIR Glen D. Furbish
Assistant Inspector General for Audits

FROM: NEA Barbara A. Leaf *pm*
Deputy Assistant Secretary

SUBJECT: Department of State Comments on SIGIR Audit12-007 "Fallujah Waste Water Treatment System: A Case Study in Wartime Contracting"

Thank you for the opportunity to comment on SIGIR's audit *"Fallujah Waste Water Treatment System: A Case Study in Wartime Contracting"*. While no one disputes the many difficulties of this project, the Fallujah Waste Water Treatment Plant has made progress.

This project turned a corner in 2008, in no small part due to SIGIR's October 27, 2008 report. Since then, we partnered with the GOI, worked collaboratively with USACE, developed a plan that was appropriate and achievable and forged ahead – with the firm objective of making the taxpayers' investment and the efforts of those who worked so diligently on this project worthwhile.

While there is substantial discussion in SIGIR's report dedicated to debating the merits of entering into this project, there is no mention of hard-won achievements:

Government of Iraq Capacity Development: Where once there was no Iraqi expertise in this field, and no functioning public works sewers department, there is now a functioning sewers department in Fallujah, developing and strengthening its operational capacity. Additionally, there is an Iraqi team from Anbar Province moving forward with a waste treatment system for Ramadi, Anbar's largest city. This is an Iraqi-initiated effort which capitalizes on the lessons learned in Fallujah.

Healthier Environment: Prior to USG/GOI efforts, waste was dumped directly into the Euphrates River. It is important to recognize the significant health and environmental benefits to the public of treating the waste from a city of 220,000 people, rather than disposing of it in the Euphrates River.

Interagency Collaboration: DOS and USACE worked together to develop and award a grant to the Ministry of Municipalities and Public Works that the Ministry used to contract with local Iraqis for continued construction of the collection system. The Ministry successfully awarded this contract – and for a cost of less than half of what had been estimated by project engineers.

Sustainability: In 2010, the Ministry of Municipalities and Public Works discussed with the USG the Ministry's strong desire to complete the entire city-wide system. The Department of State and the GOI agreed to a partnership to complete this critical project. The U.S. funded, through a grant, the construction of two sewer mains and the Government of Iraq awarded a contract for completion of the system for the remainder of the City. The U.S. awarded \$3.1 million for the mains. The GOI awarded a \$67 million contract this summer for the design and construction work necessary for the completion of the system throughout the city of Fallujah. This award includes long term maintenance – also evidence of capacity development in this field.

To those who worked on this project, or to the families of those who lost their lives working on this project, this project was not abandoned, was not allowed to fail, and now represents a partnership between the GOI and the U.S. to complete this important work. We invested far too much in taxpayer funds and in lives to walk away from this project – and leave an abandoned, \$100 million project of no use to anyone. Instead, I would respectfully suggest that the Fallujah Waste Water Treatment Plant is a model of how to turn around a project on the verge of failure.

Thank you again for the opportunity to respond.

Appendix G—Management Comments



DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
441 G Street, NW
Washington DC 20314-1000

REPLY TO
ATTENTION OF:

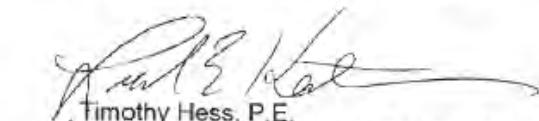
CEMP-TAD

OCT 23 2011

MEMORANDUM FOR Office of the Special Inspector General for Iraq Reconstruction
(SIGIR)

SUBJECT: U.S. Army Corps of Engineers (USACE) Response to SIGIR Draft Report –
Fallujah Wastewater Treatment System: A Case Study in Wartime Contracting (SIGIR
12-007).

1. The U.S. Army Corps of Engineers (USACE) welcomes the opportunity to review the draft report and appreciates the cooperation of SIGIR staff.
2. USACE concurs with the report subject to changes previously agreed with SIGIR staff.
3. My point of contact for these comments is Mr. John Daley (202) 761-5844


Timothy Hess, P.E.
Acting Chief, Transatlantic Division Regional
Integration Team,
Directorate of Military Programs

Appendix H—SIGIR Mission and Contact Information

SIGIR's Mission	Regarding the U.S. reconstruction plans, programs, and operations in Iraq, the Special Inspector General for Iraq Reconstruction provides independent and objective: <ol style="list-style-type: none">1. oversight and review through comprehensive audits, inspections, and investigations2. advice and recommendations on policies to promote economy, efficiency, and effectiveness3. deterrence of malfeasance through the prevention and detection of fraud, waste, and abuse4. information and analysis to the Secretary of State, the Secretary of Defense, the Congress, and the American people through Quarterly Reports
Obtaining Copies of SIGIR Reports and Testimonies	To obtain copies of SIGIR documents at no cost, go to SIGIR's Web site (www.sigir.mil).
To Report Fraud, Waste, and Abuse in Iraq Relief and Reconstruction Programs	Help prevent fraud, waste, and abuse by reporting suspicious or illegal activities to the SIGIR Hotline: <ol style="list-style-type: none">1 Web: www.sigir.mil/submit_fraud.html2 Phone: 703-602-40633 Toll Free: 866-301-2003
Congressional Affairs	Hillel Weinberg Assistant Inspector General for Congressional Affairs Mail: Office of the Special Inspector General for Iraq Reconstruction 2530 Crystal Drive Arlington, VA 22202-3940 Phone 703-428-1059 Email hillel.weinberg@sigir.mil
Public Affairs	Deborah Horan Director of Public Affairs Mail: Office of the Special Inspector General for Iraq Reconstruction 2530 Crystal Drive Arlington, VA 22202-3940 Phone: 703-428-1217 Fax: 703-428-0817 Email: PublicAffairs@sigir.mil